

The Iron Age

INDEX TO
READING MATTER
PAGE 38.

A Review of the Hardware, Iron and Metal Trades.

INDEX TO
ADVERTISEMENTS
PAGE 25.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXXIV: No. 19.

New York, Thursday, November 6, 1884

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

The Hoffmann Regenerator Coke Oven.

The following paper on coke ovens, by Dr. C. Otto, was read at the Chester meeting of the British Iron and Steel Institute:

It is long since attempts have been made to construct coke ovens in such a manner as to produce not only coke, but also to utilize the by-products of coking. The first coke ovens on this system were built in France in 1862, while England and Germany have only begun within the last few years to construct coke ovens with extraction of the by-products. To my knowledge about 150 coke ovens in France and 50 in England are now working on this principle. In Germany there are now working 190 of these ovens, which number will be increased in a short time to 390. I comply with the desire of your president by describing in this paper a system of coke ovens designed for the extraction of the by-products, of which 90 are working in Germany, while 200 more are about to be constructed. In Austria, again, 30 of these ovens will shortly be set to work. The inventor of the system in question is Herr Gust. Hoffmann, of Gottesberg, in Silesia. Its essential features consist in the combination of coke ovens with the Siemens regenerator, in order to heat the air serving for the combustion of the gas to as high a degree as possible. The temperature necessary to maintain the coking process is obtained in common coke ovens by the combustion of the gases evolved in the interior of the oven, or of its side flues, the hot gases being burnt in the immediate proximity of their place of origin.

The coke oven illustrated by Figs. 1 and 2 has no direct communication between the coking space and the side flues. In fact, except the openings for charging, F O, and for discharging the oven, which are closed during the coking process, there are only two openings, G A, in the roof of the oven by which the gases escape. The side wall of the coke oven contains, under the abutment, a horizontal canal which passes over the entire set of vertical flues, and which is the means of communication between these side flues. Every bottom flue is divided across its length by a partition wall into two equal lengths, S K₁ and S K₂. Each of these lengths communicates with a regenerator, which serves for heating the air destined for the combustion of the gases. S K₁ communicates with L R₁, and S K₂ with L R₂. These regenerators are long flues filled with fire-bricks on the Siemens regenerative plan, in order to obtain a great surface. They extend below the whole of the coke ovens, and communicate at one end, by means of a clack-valve, either with the pipe conveying air or with the chimney. On two sides gas-pipes are placed along the battery, of which I will speak immediately. Imagine, now, that the ovens are hot, and that the coking process is going on. The gases from the coal escape by the openings G A in the roof of the oven into the rising pipes S R and into the receiver V L. The valve V placed between the rising pipe and the receiver, by which the communication between the oven and the receiver can be interrupted, is now opened. From the receiver V L the gases go to the condensation house, where they are cooled and washed by different apparatus. The gases returning from the condensers, where they have lost their tar and ammonia, are forced back to the ovens through the gas-pipe G D R by the same exhauster which had sucked them to the condensers, and by means of which the whole motion of the gases is caused.

According to the position of the clack-valve in the gas-pipe, the gases enter now either into the gas-pipe on one side or into the gas-pipe on the other side of the oven. The bottom flue of every coke oven communicates with the gas-pipes by means of a nozzle-pipe furnished with a tap. Assume that the clack-valve inside the gas pipe is placed in such a manner that the gas goes to the gas-pipe G D R₁; then the clack-valve W of the air regenerators must be placed so that the air is forced by a fan into the air regenerator L R₁. The air regenerator L R₁, and the nozzle-pipes of the gas-pipe G D R₁, discharge at every coke oven into the bottom flue S K₁. In this manner gases and hot air enter into the bottom flue S K₁. The combustion of gases takes place first in the bottom flue and continues in the side flues. The whole current of the burning gases and of the very hot products of combustion rises by the parallel side flues V Z₁ into the horizontal flue H K, and thence falls down through the side flues V Z₂ into the bottom flue S K₂, whence the gases, which may now be considered as completely burnt, pass through the air regenerator L R₂, and then escape through the chimney, delivering their heat to the lattice-work of the air regenerator on their way. After a certain time, say about an hour, the position of the clack-valves in the gas-pipe and in the air flue are changed, so that the direction of the gas and air is reversed.

The gases escape out of the gas-pipe G D R into the pipe G D R₂, while air enters into the air regenerator L R₂. Combustion takes place in the bottom flue S K₂, and the current of gases, air and products of combustion passes through V Z₂, H K, V Z₁, S K₁, and the air regenerator L R₁ into the chimney. In this manner the current of gases passes alternately in the two directions through the bottom flue and side flues of the coke oven, whereby a remarkably even temperature is obtained in the oven. The heat of the prod-

ucts of combustion is for the most part absorbed by the regenerator for heating air, which attains a temperature of 1800° F. In one of our German coking works we produce per coke oven per day 24,700 cubic feet of gas, whereof we require for the coking process only 17,700, so that we have a surplus of 7000 cubic feet of gas per oven per day. The bottom flues and side flues are so extremely hot that with a charge of 5 tons 13 cwt. of dry coal the coking process lasts only 48 hours, or the same time as in coke ovens without extraction of the by-products. In general, we have it in our hands to regulate the temperature of these coke ovens by aug-

flues and the coking space. Ordinarily we make these wall bricks 3 1/4 inches thick; by way of trial we have even diminished this thickness to 2 3/4 inches, and we have found that in the latter case the coking is completed several hours sooner than in the former. The combination of Siemens regenerators with coke ovens is independent of the construction of these ovens, and can be applied to coke ovens on other systems. The coolers, Figs. 3 and 4, are vertical iron cylinders closed at each end, in which are vertical iron tubes fastened to the top and the bottom, and open at each end. Above the cover is placed

Our washers, Figs. 3 and 4, are vertical cylinders of cast or wrought iron, in which a great number of perforated plates are placed horizontally over one another. A continual stream of cold water trickles down upon the uppermost plate and through it to the others, so that from plate to plate a rain of drops is constantly passing in the opposite direction to that of the gas, the latter in its upward passage giving up to the water the ammonia which it contains. The washers retain the whole of the tar and ammonia not yet condensed in the coolers. If we have cold enough water at our disposal, the temperature of the gas will be lowered in the

and the condensers C₂ into t₂. The products of condensation deposited in the scrubbers S C₁ run into the vessels T₁, and those in S C₂ into T₂. Out of the vessels T₁, t₁ and T₂, t₂ tar and ammoniacal liquor run through the pipes R₁ and R₂ into a tank situated outside the condensation house, out of which tank they are raised, when required, by small pumps into another tank above the gas coolers.

The gain of ammonia, counted in sulphate of ammonia, amounts in Westphalia to 1 per cent. of the weight of dry coal put into the coke oven. This gain corresponds exactly with the contents of ammonia as ascertained by analysis. The quantity of ammonia contained in the coal varies in certain districts, and even in the same coal district. In the Saarbrücken district the coal yields only 0.7 to 0.8 per cent. of sulphate of ammonia, whereas this figure rises in Upper Silesia to 1.1 to 1.7 per cent. The yield of tar at one of our coking establishments amounted in seven months to an average of 3 per cent. on the dry coal put into the coke ovens. The tar contains less benzene than that produced in gasworks, but the amount of naphthalene and anthracene which it contains is equal to that contained in gas tar. We have analysed the gas produced during the coking process after its passage through the condensers. It contains a smaller amount of light-giving elements than the gas supplied by gasworks; in other respects its composition is the same:

	Vol. per cent. dry gas.
Benzene vapor.....	0.61
Athylene.....	1.63
Sulphuretted hydrogen.....	0.43
Carbonic acid.....	1.41
Carbonic oxide.....	6.49
Hydrogen.....	53.32
Methylene.....	36.11
Total.....	100.00

I have already said that the gas which returns from the condensers is not all used in the coking process. The surplus can be converted into money. By the use of very large burners it can be applied to purposes of illumination in factories, iron or coal works, or for heating boilers, &c. For heating purposes it has the great advantage that it can be conducted to very great distances without suffering in quality. We have ascertained that by the daily combustion of 2 tons 14 cwt. of coal per oven we can depend upon obtaining sufficient waste heat from every oven to heat 54 square feet of boiler surface. A heating surface of 54 square feet per coke oven corresponds with an evaporation of 1 pound of water for every pound of coal coked. I cannot say whether or not these figures are surpassed by English coals. They refer to trials made with Westphalian coal, and can therefore be compared only with results obtained with those coals. In Westphalia, with an ordinary coke oven without extraction of the by-products, containing 5 tons 18 cwt. of coal, we heat 80 square feet of boiler surface, or we evaporate 1 1/2 pounds of water by every pound of coal coked. We see, then, that the gas produced by coke ovens loses less heating power in its passage through the condensers than we might have supposed, and that we can not only extract the by-products, but also heat boilers, with the gas which has undergone this process, together with the highly-heated products of combustion which have passed through the air regenerator.

The New Dispatch Boat Dolphin.

The dispatch boat Dolphin, built for the United States Government by John Roach & Son, of Chester, Pa., has made her trial trip to this port. The Dolphin is built of steel, and her structural arrangements are those common on merchant vessels, except that unusual care has been taken in the division of the hull into six water-tight compartments by transverse bulkheads extending to the upper deck. Her bow is slightly ram-shaped, and is made specially strong. She is rigged as a three-masted schooner, her spars are small and slight, and there is no headgear. She has a flush-open spar-deck, without a poop-cabin or fore-cabin. She has a small central deck-house near the cabin gangway, and another around the boiler and engine hatches. Otherwise the deck is uninterrupted fore and aft. She is provided with steam steering gear, artificial ventilation and electric lights throughout, including electric head-lights, search-lights, &c. Her armament consists of one 6-inch breech-loader and four Hotchkiss revolving guns—two forward and two aft—mounted in the extremities of each bridge in fixed armor-towers. The vessel's dimensions are 240 feet in length, 32 feet beam and 1500 tons displacement. The vessel made an average of 15 knots an hour on her trip, and is said to have behaved in a satisfactory manner in all respects.

The casting of bronze statues of Buddha is carried on in Bangkok. The process, says a late official report, is of the kind known as *en crepe*, and the alloy used consists of copper and lead, sometimes with the admixture of a small quantity of zinc. A clay model is first made; upon this a coat of wax is molded, and over this is put another layer of clay. The whole is then baked, the wax running off through apertures left for that purpose, and the central core being kept in its place by iron pegs, the alloy is then run into the space previously occupied by the wax.

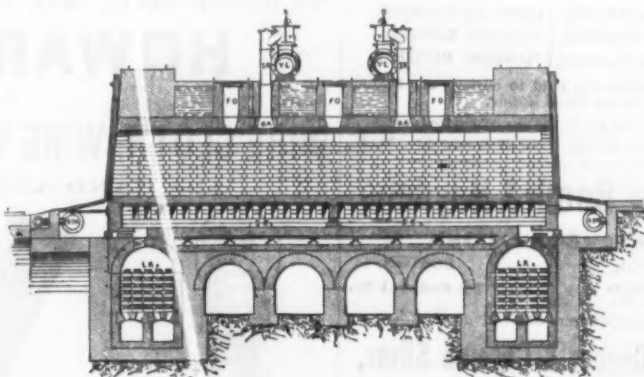


Fig. 1.—Longitudinal Section of Coke Oven.

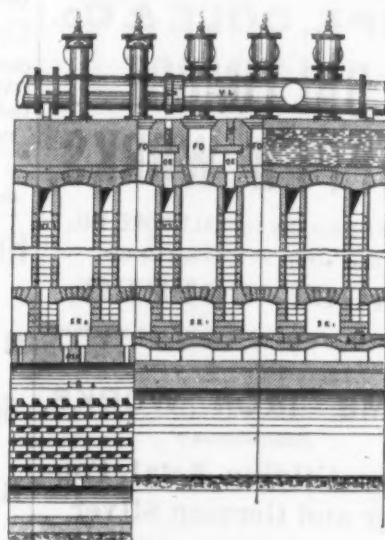


Fig. 2.—Transverse Section of Coke Oven.

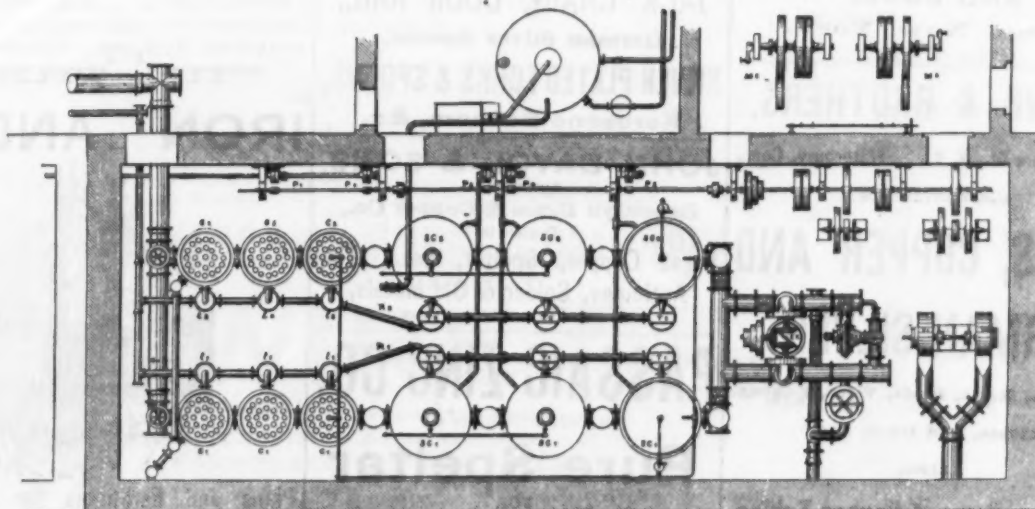


Fig. 3.—Sectional Plan of Condensing Apparatus.

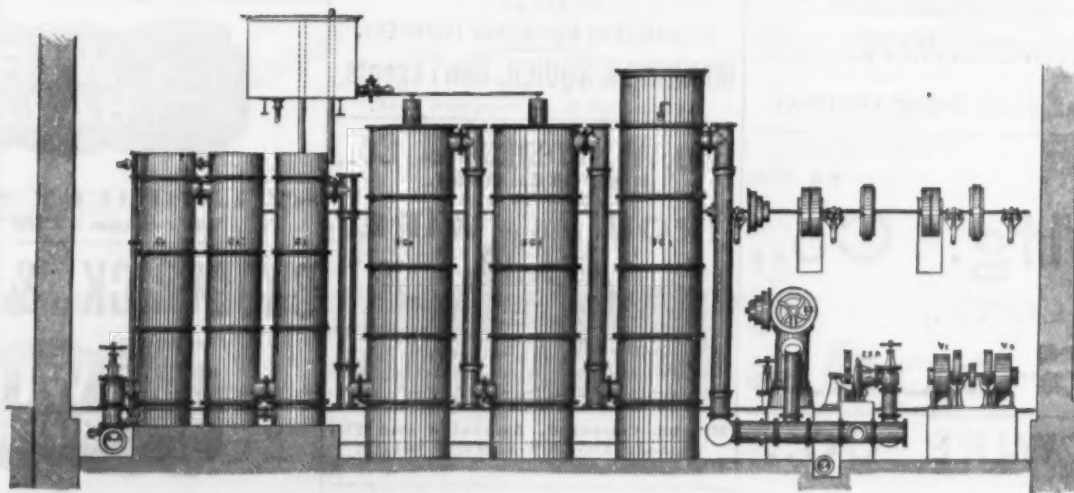


Fig. 4.—Elevation of Condensing Apparatus.

THE HOFFMAN REGENERATOR COKE OVEN

menting or reducing the quantities of gas and air, which can be exactly adjusted. The quality of the coke is at least equal to that which we obtain in the ordinary coke ovens. The yield of coke in coke ovens with extraction of the by-products is already several per cent. higher than in common coke ovens, on account of the air-tightness of the charging and discharging openings, and a slight pressure of gas in the ovens. We have proved the following temperatures:

	Deg. F.
In the bottom flue.....	2300—2570
In the side flues.....	2000—2200
In the regenerator, when the current of air was first admitted.....	1800—
One hour afterward.....	1350—
In the chimney.....	950—992

The drawings represent a coke oven with vertical side flues. This construction finds great favor in Germany, because the arrangement of the bricks makes it possible to give very small dimensions between the side

a cylindrical iron reservoir. The water flows through the tubes, while the current of gas passes outside them in the opposite direction. These coolers have a cooling surface of 5.73 square feet, 1000 cubic feet of gas passing through. To the coolers now in construction we give as much as 7.6 square feet of cooling surface for every 1000 cubic feet of gas, having found that a great cooling surface is very advantageous for condensation. Condensers placed behind coke ovens must have a cooling surface proportionally greater than those of gas works, because the production of gas in coke ovens is less regular than in retorts. We have measured the temperature of the gas after it passes out of the coke oven, and we have found:

	Deg. F.
In the rising tubes.....	1900—1900
In the receiver (according to the distance from the oven).....	400—750
Before the coolers.....	170—250
Beyond the coolers.....	65—85

washers to 55° F. Our washers offer to the gas a surface of 7.8 square feet to every 1000 cubic feet gas.

Figs. 3 and 4 show a condensing apparatus sufficient for 20 coke ovens. The gas comes out of the ovens through the gas-pipes G A R. Then one-half of it passes through the three condensers C₁, and through the three scrubbers S C₁, while the other half goes through the three condensers C₂ and the three scrubbers S C₂. Beyond the scrubbers S C₁ and S C₂, the two halves unite and pass through the exhauster E X, which forces the gases through the gas-pipe G D R back to the coke ovens. E X R is a spare exhauster. The air of combustion is forced in by the fans V₁ and V₂, the second of which is kept as a reserve. P₁, P₂, P₃, P₄, and P₅ are small pumps for tar and ammoniacal liquor. M₁ is the driving engine; M₂ is a spare engine. The condensers C₁ let fall tar and ammoniacal liquor into the vessels t₁,

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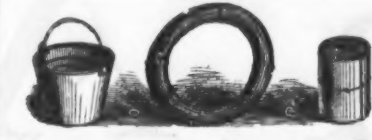
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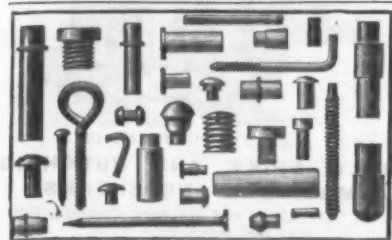
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Submarine Warfare.
The subject of naval warfare is one of the
most important with which maritime nations
have to deal. A nation's power of defense
lies in her ability to defend her coasts,
harbors and commerce, and this power of
defense is now largely dependent upon the
development of the torpedo system and the
skill attained in its use. From what infor-
mation can be gathered, although obviously
limited, it appears that the tendency has
been chiefly in one direction—in the con-
struction of torpedo boats, and this has been
confined to two classes: Boats of compara-
tively large dimensions, capable of inde-
pendent action, and small boats or launches
to be carried by large war vessels. Of the
principles involved in their construction and
their rapid development during the past few
years only brief mention will be made. They
consist, however, chiefly in the more effi-
cient division of the hulls by bulkheads, large
pumping power, arrangement for a rapid
production of steam, the ram-bow and im-
proved propelling and steering apparatus.
Mr. Thornycroft, of England, is devoting
much time and skillful research to the sub-
ject, and is constantly introducing improve-
ments and modifications in details, while
the Herreshoff Engineering Company, of
Bristol, R. I., are making steady progress in
their experiments to determine the best form
of engine and boiler and in the minimizing
of weight, space, &c.

The extent to which improved methods
and materials used in the construction of
armor has been carried, and the strides made
in the production of long-range guns, carry-
ing projectiles of great weight, capable of
enormous destruction, are generally known,
and it is equally well known that the pos-
sibility of constructing armor that shall be
impenetrable, or engines of war that cannot
be resisted, is just as far from human achieve-
ment to-day as it was some hundreds of years
ago. If we may expect what has been ac-
complished by torpedoes, the whole science
of offensive operations of war consists in
throwing stones. The introduction of the
torpedo, however, is a departure from this
old-time art, and the possibilities of torpedo
warfare would seem to warrant the belief
that much greater results will be obtained
from their use than may be anticipated from
heavy ordnance or massive armor plates.
But the method of using must be made more
certain than the random or chance shots yet
fired. While considerable advance has been
made, especially in the building and con-
trolling of torpedo boats, they have too
many inherent uncertainties, and as yet have
been almost as dangerous to the aggressor as
to the party attacked. It is true that the
smoke of any considerable naval engage-
ment is likely to somewhat reduce the force
of the latter observation, and in obedience
to the law of action and reaction, the smoke
also increases the difficulty and uncertainty
of attack to such an extent that it has be-
come essential to direct attention to this
feature and devise other modes.

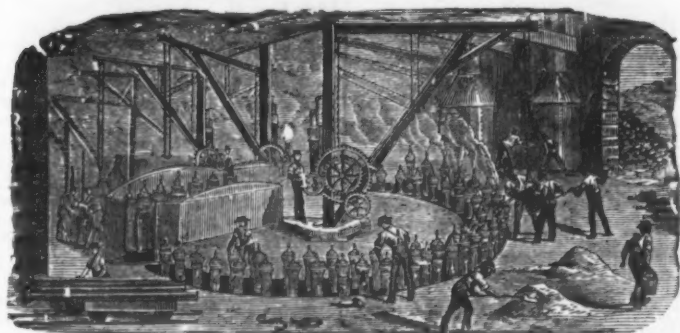
The first true submarine vessel seems to be
the one which Cornelius Van Diebelle tried
upon the Thames by command of James I.
This was moved by 12 oars, and, according
to Leibnitz, went for some distance under
the water. Whether it received external
air for respiration the same author does not
state, but it has been said by others that the
vitiated air was purified by liquid invented
by Pierre Van Diebelle. In 1693 we find an
account of "a new and extraordinary engine
of copper, iron and other metal, with glasses
for lights and joints so contrived as to per-
mit a person enclosed in it to walk and
move freely with it under water, and yet so
closely covered over with leather as suffi-
ciently to defend him from all jumps there-
of." The Journal Encyclopedique of August
1, 1772, gives an account of some experi-
ments made by Dionis, of Bordeaux. His
machine is said to have carried 10 persons a
distance of 5 leagues, below the water, in the
Bay of Biscay, and remained under water
4 1/2 hours without having its supply of air
renewed.

To David Bushnell, of Connecticut, seems
to belong the credit of conceiving the idea
of blowing up a ship by means of an explo-
sive engine applied to her hull, and he de-
signed a submarine boat which is thus de-
scribed in a paper read by him before the
American Philosophical Society: "The boat
was tortoise-shaped, very strongly built of
two elliptical plates of iron, bolted together
at the edges, and affording in the hollow be-
tween them sufficient space for a single per-
son. At the bottom it was heavily loaded
with lead to insure stability, but it could also
take in ballast for the same purpose. Besides
the operator, air sufficient to support him for
30 minutes could be contained inside. For
motion there were two screw-shaped oars—
one vertical, the other horizontal—and they
could be turned either by the hands or feet.
The only light provided was through dead-
eyes, and the compass and water-gauge were
rubbed with phosphorus to render visible." This
boat was completed in 1775, and intended
for use in the War of Independence, but
does not appear to have accomplished
anything in furtherance of its object. An
inventor lost his life in 1774, during an ex-
perimental descent in Plymouth Sound, in a
vessel of about 50 tons burden. He intended
to make it rise after submersion, but failed,
and nothing further is known concerning his
apparatus. From 1796 to 1801 Fulton was
in France making experiments under the
patronage of Bonaparte, and is said to have
so far perfected his Nautilus that he could
immerse it 25 feet under water and remain
an hour. In 1854 a patent was granted to
J. H. Johnston, for a vessel with several
compartments, some open to the water, as a
diving bell. The air was to be purified by
an alkaline solution.

A "Nautilus," which the Journal of the
Society of Arts describes, March 6, 1857, and
a submarine boat invented by J. M. Masson,
1859, brings us down to the outbreak of the
Civil War, which gave considerable impulse
to the subject of torpedoes and submarine
warfare. During 1859, however, a Mr.
Delaney, of Chicago, took to England a sub-
marine boat. According to his patent the
vessel was egg shaped in transverse section,
diminishing to a point at each end. It had
two iron tanks in the interior, one to con-
tain air forced into it by an air pump, a
pipe provided with a stop-cock connected

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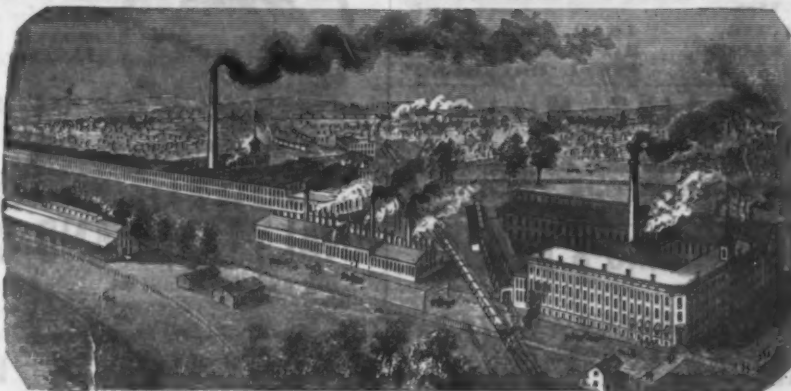
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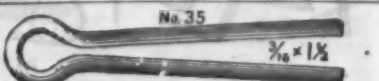
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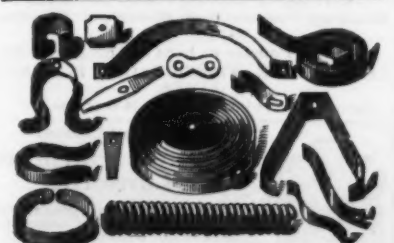
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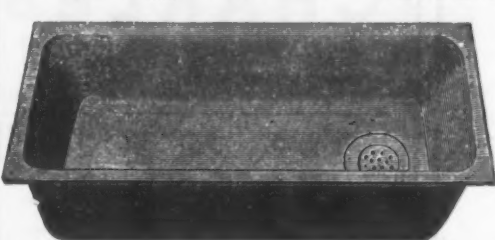
FIG. 120.



FIG. 209.



FIG. 70.

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with the second tank, which contained water. The engineer could, by pumping water into or out of the second tank, through the action of the air in the first, raise or lower the boat as desired to different levels. The damage done to the Memphis and the Ironsides, the sinking by Lieutenant Cushing of the Confederate ironclad Albemarle, as also the destruction of the sloop of war Housatonic, in February, 1864, are matters of more or less familiarity. At an early period of the war a Frenchman received the sum of \$10,000 from the United States Government for an invention of a submarine boat specially intended to blow up the Merrimac; but at about the date of its completion the inventor, who had been engaged to superintend its construction, disappeared, and it is said that no one was found who understood its management, in consequence of which it was never tried.

A model of a submarine boat was exhibited at Paris in 1867. She was propelled by a screw, the engine being worked by compressed air. A life-boat was secured to it, and in addition to the main screw there was a small screw in a vertical position to assist in ascending and descending. The Spuyten Duyvil, built for the United States Government, and of which a complete description and plates may be seen in Lieutenant Barnes' "Submarine Warfare," and a torpedo boat invented by Mr. Holland, were never practically tried.

The Intelligent Whale, which was invented about 1865, attracted some attention. It was built of boiler iron, 26 feet long and 9 feet deep, and was propelled by hand. It was provided with tanks containing air at a pressure of 200 pounds per square inch, and also larger tanks to be filled with water for sinking the boat. These tanks communicate with air-tanks and with the water outside the boat. This boat held 13 persons, and was tried in the Passaic River with that number on board. In actual operations, after reaching the point of attack, a man in submarine armor passes out of the boat, places the torpedo under the vessel to be destroyed, and then returns to fire the shell by electricity at a safe distance. The United States Government ordered a trial of this boat in 1872, which proved a complete failure, as reported by the officers detailed to make the experiments.

The year 1869 produced two submarine boats, one by an engineer of the United States Navy and one by Dr. Barbour, of New York. The first proposed a cigar-shaped vessel, to be propelled either by steam or by hand. In the case of steam, he proposed to adopt the finless system—that is, steam to be raised to a pressure of, say, 200 pounds per square inch, and then to draw the fires. It could also be operated by hand. The vessel was to contain air sufficient for the crew to remain submerged at least a half-hour, and was to be steered by a rudder and fins. It also contained a water chamber and pumps, by which its specific gravity could be increased or diminished. Dr. Barbour's boat was to be 22 feet long, 3 feet beam and 5 feet deep, to be driven by a pair of oscillating engines, the motive power being derived from liquid ammonia or carbonic-acid gas. In addition to the rudder, there were two fins on the sides of the boat to assist in elevating or depressing the boat while in motion. It also was provided with compartments which could be filled alternately with air or water for controlling the buoyancy. For war purposes the inventor proposed to secure the torpedoes, which were made buoyant by means of an outer casing, on the top of the boat. When making an attack, the boat was to pass under the enemy and while there the "Captain" was to detach the torpedoes by turning a thumb-screw. The shells rise under the vessel, and the operator retains the end of iron in order to make electrical contact whenever, in his judgment, a sufficient distance has been placed between his boat and the vessel it is proposed to demolish. No trial of this boat, we believe, has been made, nor is it known that the boat has ever been constructed.

During the past few weeks several brief notices have been given by the daily press of what has been called a "new" submarine torpedo boat. It is "new" in at least one sense, viz., that its construction was begun some time during last summer, and is yet to be fitted with machinery and motive power. In order, however, to understand the evolution of this "new" invention, let us begin with the earliest information which is at hand concerning it, and which is found in a little pamphlet published by the Submarine Monitor Company, of this city. In this pamphlet, after making a brief mention of the amounts expended on the navies of the world, and some remarks on the subject of submarine warfare, especially as to the uncertainty and lack of efficiency in previous work, it is stated that "how to construct a boat that can be propelled beneath the surface of the water for any length of time has for a long time puzzled the brains of the ablest marine architects of the world. The two great difficulties were with respect to the motive powers and the supply of air." On another page, following instances of the use of electricity as a motive power, we find the following: "With electricity as a motive power a submarine boat became possible, for, as will be shown further on, the necessary supply of air can be obtained without difficulty. The Submarine Monitor was invented (1) by Prof. J. H. L. Tuck, and brought to practical perfection (1) after 20 years of toil and experiment. The chief trouble he met with during that time was to find a power to propel his boat under water at any depth and be independent of the shore or surface."

Some experiments have been made with the boat under the supervision of the inventor, and the use of storage batteries to supply electricity for motive-power has proved unsuccessful. After "20 years of toil and experiments" the electric mechanism is discarded, and now it is proposed to go back a few years and try a gas or some other engine. So far, then, we have nothing "new." Again, we quote: "Compressed air is stored in the boat. Chemicals will also be used to replenish the elements of life breathed out of the air." Fulton, in 1801, took a supply of compressed air into his Nautilus, and 280 years ago Van Drebbel used chemicals to purify vitiated air in a submarine boat. So that the supply and

purification of the air to be used as proposed is not quite "new." Further on it is stated "that by a simple contrivance two rubber tubes can be sent to the surface from a depth of 20 feet, and the boat and air-pipes re-filled with fresh air." Regarding this it may be said that Daniel Bushnell, about 1775, fitted to his submarine boat two ventilating tubes which closed automatically under water and opened in the air. There is still another feature to which reference may be made, and which is described as follows: "In the center of the deck is a manhole or well, with an air-tight door on the side and an air-tight hatch at the top. When the captain desires to go on deck for action or any other purpose, he puts on a submarine armor, opens the door, steps into the well, closes the door after him, connects an air-tube with his helmet, which is connected with an air-pump in the boat; he then opens a water-cock, fills the well, which takes the pressure off the hatch, then opens the hatch." This is the well-known method of "locks" used in compressed-air work. In 1854 a patent was granted in England to J. H. Johnston for a vessel with several compartments, some open to the water, as in a diving-bell, but this idea seems to be clearly covered in the Intelligent Whale, previously mentioned, so that no further comment is necessary.

During the war between Russia and Turkey a considerable expenditure was made for torpedo service, Russia alone having built no less than 100 torpedo boats. In a very interesting series of articles published recently in *Engineering*, under the title of "The Battle of Port Said," very much space was devoted to the consideration of torpedo boats, and they are there made to perform nearly, if not quite, the most effective part in the story of an imaginary naval engagement. In an editorial on the subject of torpedo warfare, in *Engineering*, the following statement was made some time since: "It may, of course, be said, as it often has been, that the blowing up of the Turkish ironclad was rendered possible by the almost incredible carelessness and apathy of the Turkish officers and men on board, and that, if proper precautions had been taken, such as would be taken in an English man-of-war, it could not have happened. This might be perfectly true, and yet the extreme value of the torpedo launch as a most formidable antagonist remains manifest. With a fleet in confined hostile waters, the fact that weapons so terrible are lurking about in protected places, within, perhaps, a few minutes' reach, ready for a rush, must always produce an enormous moral effect even in daylight, for a large portion of a ship's crew cannot be kept circulating round her in boats, night after night, to ward off such reptiles without producing considerable strain. The experience of the British fleet in Besika Bay, the Dardanelles and Sea of Marmora during recent critical times must have brought home this fact directly to them. They may, and doubtless did, feel perfectly confident that they were fully protected against torpedo boats, but they had to pay the penalty of security in restless, ceaseless watchfulness, the more trying because against an attack that might never come."

It does not appear that the field of invention has been exhausted in this direction, or that it is as difficult as aerial navigation. But careful and intelligent effort must be made in the application of known physical laws and well-tried mechanism before a successful solution of the problem will be obtained. The present condition of the art of submarine navigation is practically just what it was many years ago, and little or no advance has been made. The difficulties involved in this work are well known, and to assemble the familiar appliances for successful submarine navigation is just as far from being realized as ever.

The New Secretary of the Treasury.

Hugh McCulloch, the new secretary, was born at Kennebunk, Me., 73 years ago. He entered Bowdoin College, but ill-health forced him to leave it before completing his sophomore year. Then he studied law, and on being admitted to practice removed to Fort Wayne, Ind., in 1833. He was chosen two years later to be cashier of a branch of the State Bank of Indiana, and also a director, and remained in that position until 1865, when he was elected president of the State Bank. That office he held until May, 1863, when President Lincoln, at the instance of Mr. Chase, then Secretary of the Treasury, made him Comptroller of the Currency. In March, 1865, he entered Mr. Lincoln's Cabinet as Secretary of the Treasury, and held that position through the troubled political time that followed until the beginning of President Grant's administration in March, 1869. He then retired to private life in Indiana, but in the following year engaged in banking business in London, in the house of J. Cooke & Co. Upon the suspension of that firm in 1873, the London house reorganized under the name of McCulloch & Co. A year afterward he returned to the United States, and since then, although participating in several large financial enterprises, he has not been engaged in active business. His winters have been spent in Washington, and during the rest of the year he has lived on his farm, about 6 miles north of Washington, in Maryland.

In an interview published in the *New York Tribune*, November 10, 1883, Mr. McCulloch declared that if he were in Congress he would favor repealing the compulsory clause of the Silver Coinage act, as this Government is now playing into the hands of Europe. He also favored a permanent Government bond at a low rate of interest, to secure bank circulation and for investment. He hoped the Supreme Court would decide the issue or reissue of legal-tender notes by the Government in time of peace to be unconstitutional. He regarded the national banking system as one of the best fruits of the war, and deemed its preservation highly desirable, though he was not ready to say precisely how it was to be preserved.

He made the following declaration in his annual report to Congress, dated December 1, 1868: "There will be in the future, as there have been in the past, widely different opinions upon this long-vexed and very important subject, but the indications are de-

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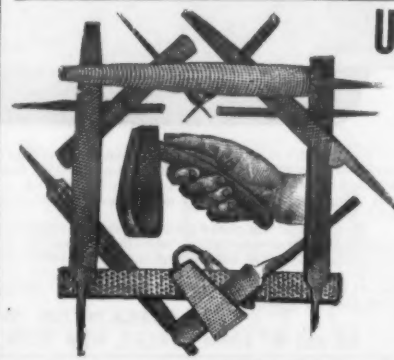


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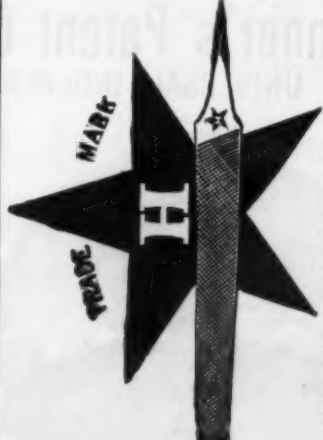
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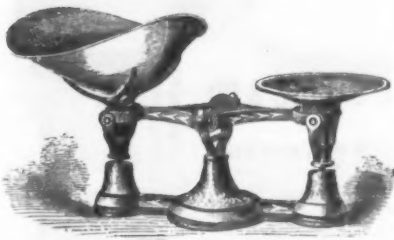
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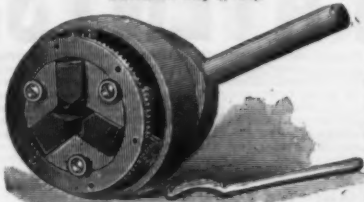
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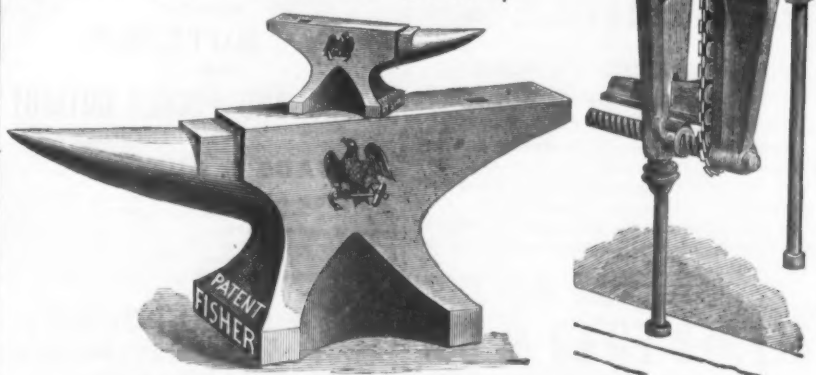
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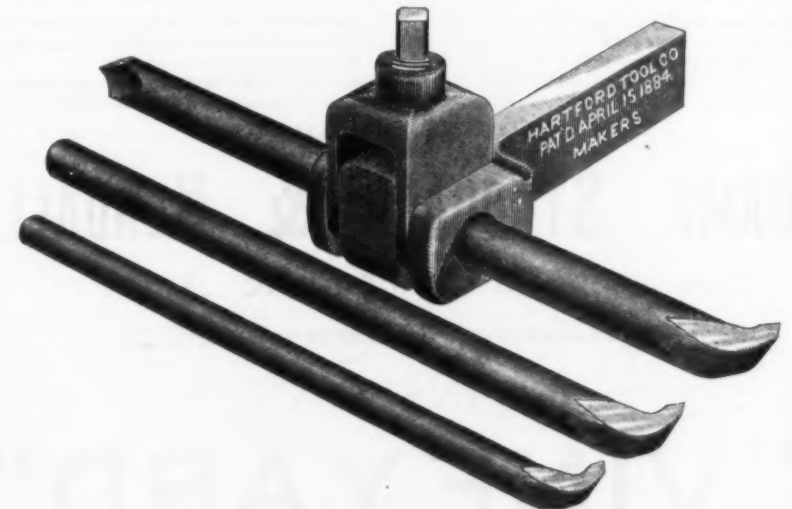


cided that the more enlightened sentiment of the country demands that the tariff shall hereafter be a tariff for revenue, and not for protection, and that the revenue to be derived from it shall be no larger than, in connection with those received from other sources, will be required for the economical administration of the Government, the maintenance of the public faith and gradual extinguishment of the public debt. While the country is not at present, and may not be for many years to come, prepared for the abrogation of all restrictions upon foreign commerce, it is unquestionably prepared for a revenue tariff."

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The Hartford Tool Company, of Hartford, Conn., are now supplying the market with the tool shown in the annexed cut, and which is designed as a substitute for inside turning and threading tools, as usually made by forging from flat bar steel.

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BORING AND INSIDE THREADING TOOL

ment of the cutter bar with the centers of the lathe is assured by the construction of the holder, and in using it is only required to set the cutter-bar parallel with the ways of the lathe.

A Smokeless Locomotive.

A short time ago it was stated that a new locomotive, invented by Mr. Charles B. Coventry, was on trial on the Chicago and Northwestern Railway, which, it was claimed, was destined to solve the problem of preventing the emission of dense smoke and cinders from locomotive stacks. The locomotive was tried in freight service of the Chicago and Northwestern for three weeks, and Western papers say that it has given the greatest satisfaction. During two succeeding weeks it has been on trial on the suburban trains of the Chicago, Rock Island and Pacific. The poorest quality of bituminous coal was used, and yet at no time, although at one point it ran 50 miles an hour, did any black smoke come out of the stack. Not a particle of cinders and dust was thrown out. The smoke that was emitted was thin and white-looking—much like escaping steam. There was no bad odor from escaping gas, as is the case on ordinary engines. Mr. Coventry explained that the gases on ordinary engines are usually thrown out of the stack, which is the cause of the density of smoke. On his engine the gases are all burned, and this is what causes the absence of smoke, which results, of course, in a saving in fuel.

The new locomotive presents an entirely different appearance from those now in use. Instead of having a large, conical-shaped smokestack in front, it has a straight smokestack, similar to those in use on locomotives in England and Europe, in the rear just in front of the cab. The boiler has two sets of flues, small ones in the lower part and larger ones in the upper part. The smoke runs 12 feet through the lower flues, and then returns by the larger flues to the rear, where the smokestack is placed. Thus the smoke traverses 24 feet before reaching the smokestack, instead of 12 feet, as is the case in ordinary boilers. The heavy cinders and dust, not being able to rise from the lower small flues into the upper large ones, fall into a smoke-arch in front and can be emptied on the ground at any time. There is another smoke-arch to catch the lighter particles of dust and ashes at the end of the larger flues in the rear end of the boiler. Thus nothing but a light white smoke passes through the smokestack in the rear, and no cinders, sparks or fire are thrown out. The engineer in charge said that he liked the new locomotive much better than the ordinary ones; she was a free-steamer and was easily handled, and, there being no cinders or dust thrown out, himself and the fireman felt much more comfortable.

Graphic Processes.

In view of the rapidly-increasing public interest shown in connection with the various methods of book illustrations now in practice, the following summary of the principal graphic processes of the United States, taken from a recent issue of the *Art Age*, will no doubt prove welcome: The processes may be divided conveniently into two groups: Those which give prints in many colors and those that are limited to single color results. In the first group are lithography, zinc-plate relief printing, and some photographic methods, such as artotypes and Bonnaudtypes. In the second group is included photo-engraving, wood engraving, steel engraving, etching and the phototypic processes variously named albertypes, heliotypes, artotypes and phototypes. All of these processes have their respective merits; all can be used for book illustration, provided that the information is acquired of how to use them, where to use them and what are their various limitations. Only familiarity with their technical possibilities can determine these questions satisfactorily, and the attempt here will be to give but a general idea of their value for certain kinds of work, judging by results to be attained by each.

In selecting a process or processes for illustrating a book, certain considerations always arise: The number of impressions, probable cost and the character of the original sketch, drawing or painting. In inverse ratio to the number of impressions should be the cost per single impression, and any process that does not come within this rule is practically of but little commercial value. In like manner the limitations upon the character of the original increase as facility is acquired in reproducing. That is to say, if the artist is given greater liberty with reference to colors, tints, tones and effects, the difficulty of reproduction increases and the consequent cost. These facts are well known to bookmakers, and the chief aim of all improvements in process illustrations is to unite artistic freedom with mechanical cheapness. Cost, therefore, is a very fair scale on which to range the graphic processes.

Beginning with the polychrome group, the most expensive by far is chromo-lithography, an invention of many years and open to any one who cares to practice it. Three hundred or more firms are engaged in it in this country alone. As to its usefulness, therefore, there is no question, though artistically very little is accomplished through its means except by a few houses—lithography, like printing, being seriously crippled by competitive prices and the absence of art motive. The cost of chromo-lithography is mainly in the engraving by hand of the original on stone and the preparations for each additional color. The actual printing is not very much more costly than type printing. Lithography is not suitable for low-priced, short editions of fine books where art is required, many colors being indispensable to good results. Its commercial usefulness is for editions of 1000 or 5000, where simple effects are sufficient and can be gained by the use of from two to six colors.

When the edition exceeds this number lithography in six colors finds a serious rival in relief plate printing. This involves about the same amount of work at first as lithography, for instead of an engraving being made on stone it is made on a metal plate, other plates being made from this as a guide. Each color requires a separate plate, but, the plates once made, the printing can be done at less cost than in lithography. The Kate Greenaway books were printed in this fashion at London, but their copies were lithographed here. The difference was apparent. The London book had a bright, hard, sharp, clean look, but the American book was thick, soft and oily—a difference always perceptible with chromo-lithography and chromo-lithography. For tint printing, sharp lines and clear effects, chromo-lithography has no superior among the graphic processes. St. Nicholas has printed several frontispieces in this manner, and the Baltimore and Ohio Railroad a number of advertising leaflets. The manner of cutting of the plates for chromo-lithography varies, and much will be done in the future to lessen this element of cost. One of the most successful methods is known as the wax process, which is admirably adapted to map work or such work as the Kate Greenaway books. Besides chromo-lithography and chromo-typography there is practically nothing that comes within the polychrome group. Many attempts have been made, but none are conspicuously successful. All invoke the aid of photography, and at Paris one firm makes some exquisite reproductions in color by a process that it keeps secret. Here one establishment makes "photographs in color," known as Bonnaudtypes, by photographing by means of an ordinary negative upon paper that has been washed with tints of color approximating the natural color of the object. In this process expense again is the chief obstacle, each print requiring special handling.

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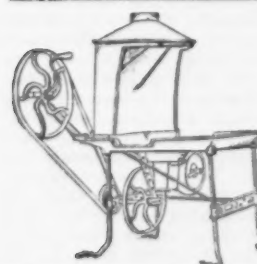
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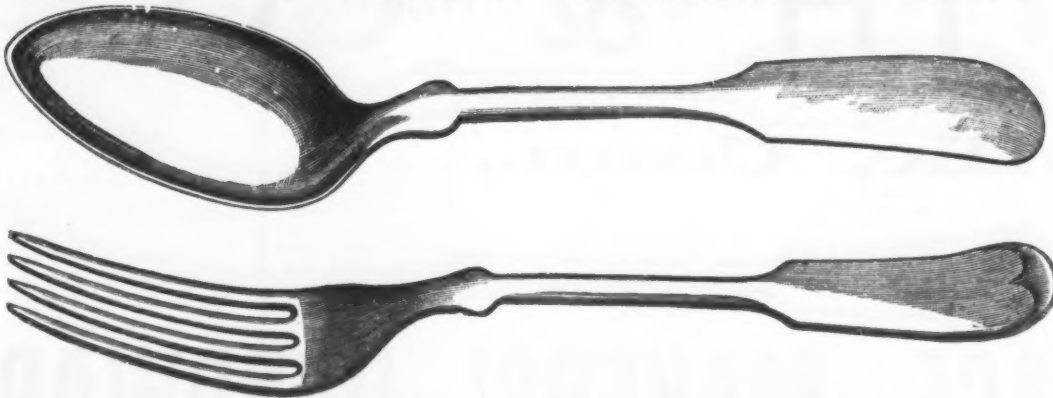
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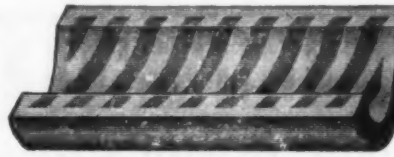
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Of the monochrome processes there seems to be no limit. Continuously experiments are in progress that seek to overcome specific difficulties, and many fortunes may yet be made by the lucky inventors of superior methods. The oldest of them is wood engraving, which involves great expense in the making of the original block. This once made, however, any edition can be printed. Therefore fine wood engraving is adapted only to the long editions of 100,000 or more, and where careful printing is found. For bad printing and short editions, wood-engraving has had its day. Following wood engraving is steel engraving. This is costly both in making the plate and in printing. With many it is a favorite method, owing to the sharpness and brightness of the lines, but, as it never reproduces an artist's original truthfully, it is not popular with the artists. Etching, on the contrary, is growing in popularity, and has the supreme recommendation of involving little cost on the plate itself—i. e., slight cost compared with the expense of a steel plate or a woodcut. The main cost comes in the printing, but, as the plate is soon worn down, etching is rarely attempted for editions exceeding 5000, and seldom for those as large. It is strictly an artistic process of illustration, and has engrossed the attention of some of the greatest masters. As the next processes in the scale of cost come heliotype, albertype, phototypes, phototypes and heliogravures. These are followed in turn by photolithography, and finally by photo-engraving.

TRADE PUBLICATIONS.

Valves and Cocks.

The Pratt & Cady Company, of Hartford, Conn., have sent out a new catalogue dated October 1, 1884, giving full particulars of their patent straightway valves and asbestos-packed cocks, and also of their well-known steam trap. It is illustrated throughout, and will no doubt prove a convenient source of information to those contemplating the use of some of the company's manufactures.

Centrifugal Pumping Machinery.

An interesting little pamphlet devoted to improved centrifugal pumping machinery constructed on the Gwynne system has just been issued by the Lawrence Machine Shop, of Lawrence, Mass., who are now placing these pumps on the market. It contains a brief account of centrifugal pumping machinery in general, setting forth the advantages of the pumps as regards setting up, maintenance and efficiency, and closes detailed tables giving sizes and prices of the different parts of the machinery as built by the Lawrence Machine Shop. Illustrations are also submitted contributing to the generally attractive appearance of the catalogue.

Specialties in Wood-Working Machinery.

Two interesting catalogues devoted to specialties in wood-working machinery, and issued by Messrs. Trevor & Co., of Lockport, N. Y., have just come to hand. One of them relates more particularly to handle, rod and dowel machinery, while the other embraces a wider variety of wood-working tools, making together a very convenient collection of data. Both catalogues are fully illustrated, and the appended descriptions of apparatus are more than ordinarily complete. Messrs. Trevor & Co. make a specialty of a superior set of handle machinery, consisting of a new gauge lathe, chucks, chuck arbor and frame, broom-handle boring and topping machine, tumbling machine, short-log sawing machine, gang-saw machine and rod and dowel machine. They also turn out a full set of wood-pulping machinery for wet pulp.

Pulleys, Hangers, Couplings, &c.

The new catalogue of Lowell's Iron Foundry and Machine Works, of Manchester, N. H., recently brought out, is one of the most attractive and neatly-arranged specimens that has come to our table for some time. While giving all the information necessary to govern the intending purchaser in making a proper selection, Mr. Lowell has carefully avoided the objectionable practice of filling the pages of his catalogue with superfluous, and consequently useless, material, and the condensed form in which the particulars are supplied will no doubt commend itself favorably to the reader. The book contains very full price lists and tables of sizes of the different manufactures of the works, and also engravings, which will be found to be useful additions.

Wrought-Iron Boilers.

Messrs. Robert Jenkins & Co., of Rotherham, England, proprietors of the Masbro' Boiler Works, have just sent us their new illustrated catalogue of wrought-iron and steel welded and riveted boilers for kitchen ranges, hot-water heating apparatus for heating greenhouses, buildings, &c., and also vertical boilers for steam engines or cooking purposes. We have repeatedly referred to Messrs. Jenkins & Co.'s manufactures in this line, and it is consequently unnecessary for us to further dwell upon them in this connection. Those of our readers specially interested in welded boilers will find the catalogue to contain much valuable information. It embraces 100 pages, is neatly bound and fully illustrated.

Steam Pumps.

A four-page pamphlet recently issued by the Gordon & Maxwell Company, of Hamilton, Ohio, supplies the trade with convenient particulars pertaining to their double-plunger steam pumps, pumping engines and hydraulic machinery. Engravings are given of several types of pumps built by them, together with price lists of all the sizes kept in stock.

The Dean Bros. Steam Pump Works, of Indianapolis, Ind., have issued a price list of their "Duplex" steam pumps as a supplement to Catalogue No. 11. It covers four pages, and, in addition to the tables, gives particulars and illustrations of their

"Duplex" pump and their combined pump boiler.

Steam Engines and Boilers.

Messrs. Smith, Ungers & Schnier, of Cincinnati, Ohio, have favored us with a copy of their new illustrated catalogue of engines and boilers, circular saw mills and saw-mill machinery in general. It is a well-arranged and instructive publication of its kind, embracing 42 pages replete with illustrations, tables of dimensions and detailed descriptions of their manufactures. Interesting paragraphs are devoted to the comparative merits of long and short stroke engines, methods of determining the horsepower of an engine, &c.

Die-Stocks.

The "Duplex" die-stock is illustrated and described in a small catalogue recently sent us by the Hart Manufacturing Company, of Cleveland, Ohio. The claims made for the appliance are set forth in detail, and explanations and directions for using it are given. In addition there are tables giving sizes and prices of pipe taps and die-stocks and wrought-iron pipe measurement.

Iron Mines in Colorado.

The Calumet and Hecla iron mines, the property of the Colorado Coal and Iron Company, says a Colorado paper, are located about 12 miles north and east of Salida, near the head of Fleming Gulch. The company own, in addition to the Calumet and Hecla, the Smithville, Calumet No. 2, Hecla No. 2 and Smithville No. 2. The principal development has been made upon the Calumet lode, and consists of three inclines run on the vein. No. 1, the first one run, is down 345 feet, and Nos. 2 and 3 are down to the 200-foot level, all three of which were run in solid marketable ore. The further development consists of a cross-cut tunnel, 8 x 9 x 10, 757 feet in length, which, when completed, will be the outlet for all the ore mined above.

The Calumet, Hecla and Smithville were discovered and located in 1880 by some Lake Superior iron miners, who sold them to the company in 1881. Active operations were at once commenced, and the shipments of ore to the company's furnaces at Pueblo have averaged 50 tons per day since December, 1881, giving employment to 92 men. The ore is a magnetite, and averages 50 per cent. metallic iron without sorting. However, specimens can be found in abundance that are nearly pure iron.

On August 1, owing to the low price of iron and other causes, the working force was reduced to 16 men, who are engaged in breaking ore in the stopes. The vein has been opened up for a distance of 600 feet in length and will average 50 feet in width for that distance, while at some points prospecting with the diamond drill has shown it to be 100 feet in width. The ore broken in the stopes is guided by chutes into the inclines and carried on down into a hopper in the tunnel, where it is loaded into tram-cars holding 1 1/2 tons each, a train of eight of which makes the load drawn by one mule out through the tunnel to the inclined plane, where they are lowered 345 feet to the Denver and Rio Grande Railroad track below.

It is simply impossible to give one an idea of the immense amount of ore now broken and ready for shipment and the amount exposed in the stopes and drifts. It would require years to exhaust the amount now to be seen.

An Odd Weather Vane.—Referring to the approaching completion of the new building of the Chicago Board of Trade, a Chicago daily paper says: "The finishing touch will be put on the spire about the middle of next week, when the weather vane will be raised to its perch. It will consist of a schooner in full sail, not cut out of a sheet of metal, but made in every respect like a model. The mechanical work on the schooner has been finished. It is 9 feet long, 8 feet wide, and is built of sheet copper throughout. It weighs close to 200 pounds, and about 100 pounds of ballast will have to be stored in its forward hold to balance it, as the support passes up into the forward mast. It will receive a double coat of gilding. The schooner, together with its mounting and the putting of it up, will cost \$625. It will no doubt present a very fine appearance provided it does not occur to the beholder how absurd it is for a schooner to sail all the time against the wind, for, of course, the bowsprit is made the pointer. The public will feel a great interest in the immense clock and bell to go into the tower. The contract has been let to a clock company of New England. It is classed among the company's products as its 'No. 20, Centennial Monument,' though in point of fact the company has never made as large a clock before. It will be in general like the clock the company made for Independence Hall, in Philadelphia, but much larger. In fact, it will be the largest and most powerful clock in the United States. It will operate not only the four 10 1/2-foot dials in the tower, but a 6-foot dial in the main hall and a 30-inch dial in the delivery-room, all by mechanical connections, without the aid of electricity or pneumatic pressure. It also supplies the power for striking the hour on the gong in the main hall, as well as on the 4500-pound bell in the tower."

An Ornate Iron Building.—The Pittsburgh papers say that the Keystone Bridge Company are now constructing one of the finest iron buildings ever put up in this country. It is to be the mining pavilion for the Mexican Government, which is to exhibit at the World's Fair in New Orleans. It will be built on the Moorish style, octagonal. Each side will be 32 feet long, with a dome in the center. The whole will require about 150 tons of iron, of which a great deal is made at the works—especially all the castings, which are of the finest kind, representing figures and ornamental designs, with painting of many colors. The structure is so arranged that it can be taken apart, and will be, after the exhibition, removed to the City of Mexico, where it is to be permanently located.

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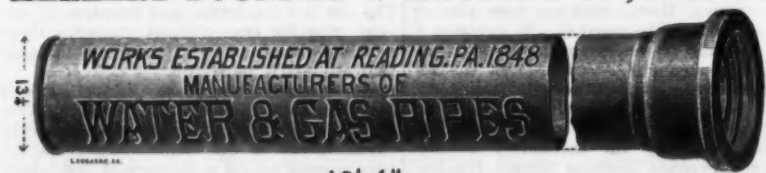
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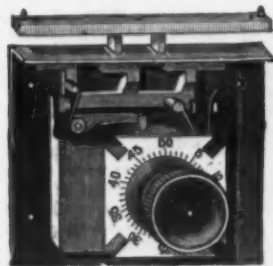
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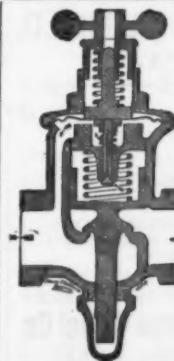
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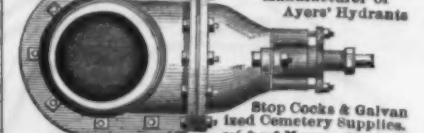
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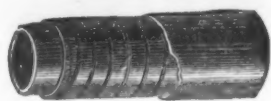
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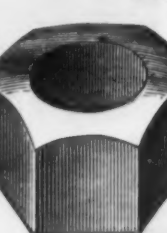
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Merrill Brothers,26 First Street,
BROOKLYN, N. Y.**DROP**HAMMERS,
FORGINGS and
POWER PRESSES.**Internal Corrosion and Scale in
Steam Boilers.***

Every steam user knows the heavy annual outlay necessitated by rapid deterioration of boiler plates and tubes, the amount of fuel wasted by reason of scale incrusting the interior, the injury it inflicts on the boiler, and the labor and expense of chipping it out with the scaling hammer. Mr. Robert Wilson, in his valuable "Treatise on Steam Boilers," says: "As a rule, steam boilers explode from one cause alone—overpressure of steam. It often happens," he says, "that boilers are too weak for the pressure they are worked at, and no accumulation of pressure beyond this is requisite to bring about their destruction." A boiler may be unfit to bear its working pressure from four causes, which he enumerates: 1. Its original design and strength not being understood by those who fix the pressure. 2. The strength, although originally sufficient, having been gradually reduced by wear and tear. 3. By a sudden overtaxing, as by unequal contraction. 4. By bad workmanship or material.

Internal corrosion is a trouble from which few boilers escape; but marine boilers are the greater sufferers. Land boilers are subject also to very serious and often rapid decay from external corrosion. The principal causes arise from undue exposure to the weather, unscientific mounting on possibly damp brickwork, leakage consequent upon faults of construction, or negligent management on the part of the engineer in charge. These sources of corrosion are commonly known, and the measures necessary to prevent them are now well understood, although it must be admitted they have been often culpably neglected. Internal corrosion may be divided into ordinary corroding (or rusting) and pitting. Ordinary corrosion is sometimes uniform through a large part of the boiler; but it is often found in isolated patches, which have been difficult to account for. Pitting, which is still more capricious in the location of its attack, may be described as a series of small holes, often running into each other, in lines and patches, eaten into the surface of the iron to a depth sometimes reaching 1/4 inch. Pitting is the more dangerous form of corrosion, and the peril is increased when its ravages are hidden beneath a coating of scale or fur which may have gathered over it; for without great watchfulness this insidious canker may go on unsuspected until a catastrophe reveals it. Ordinary corrosion has been commonly accounted for by the presence of acids in the water, but the mysterious ways of pitting have been an enigma to engineers; and although a variety of theories have been advanced to explain its capricious and peculiar methods, none were conclusive until recent scientific investigation discovered the true agency. It was long suspected that galvanic action or electricity in some form had to do with both corrosion and pitting. One theory was that voltaic action was set up between the iron shell and brass tubes, and another that differences in the quality of the iron plates produced the same result. Experiments were made from time to time to test these hypotheses, but they seem to have ended for the most part in the conclusion that electricity was inoperative either as a cause or a cure. Considered as a cure, it was set aside by some eminent engineers as mere empiricism; but most thoughtful men admitted that the action of electricity, if it really existed, was not understood.

There is another form of decay in boilers known as grooving. This also comes under the head of wear and tear. It may be popularly described as a kind of surface cracking of iron, caused by its expansion and contraction under the influence of different temperatures. It is attributable generally to the too great rigidity of the part of the boiler affected, and may be looked upon as resulting from faults of construction. It is, therefore, outside the scope of this paper, except in so far as it may be and frequently is aggravated by internal corrosion, which fastens upon the cracks and eats them more deeply into the iron. The hard, calcareous scale which is deposited by the water on the internal surfaces of the boiler may be taken roughly as identical with the fur which forms on the inside of a tea-kettle. It is composed chiefly of salts of lime, and is known by many names in different districts. On the whole, it is perhaps a greater enemy than internal corrosion, especially in land-boilers, as it brings in its train so many destructive agencies and involves so many expenses. As of fire, it may be said that it is a good servant, but a bad master—for a thin covering of about the substance of a coat of paint is found to protect the iron from rust, and is therefore favored by all engineers. Beyond this point, however, it is an unmitigated evil. In the first place, it necessitates a great waste of fuel, varying according to the thickness and character of the incrustation; but the waste of coal may be fairly put down at an average proportion of not less than 100 per cent.

When the scale is thick and hard, the proper examination of the parts beneath it is impossible until it has been entirely removed. Indeed, if it were not removed the boiler would become unworkable. Scale, therefore, being so great a foe, has to be periodically chipped away with hammer and chisel, and the process of chipping is so severe that it tends very greatly to wear out the boiler. The cost of chipping is in itself a heavy item, and it should be borne in mind that a factory boiler must, during the process, perhaps every six or eight weeks, be put out of work for several days at a time. Scale will stop the feed-pipe, which supplies water to the boiler; or, hardening over the fusible plug in the furnace crown, which is intended to melt and give warning when the water is dangerously low, will nullify this precaution, and it has thus caused both collapse and explosion. Carbonate of lime is deposited as a pulverent body, and under certain conditions, chiefly of neglect on the part of the engineer in charge, will form a hard scale similar to that we have been considering; but by proper attention a great deal of it may be got rid of by blowing down or emptying the boiler to the extent of a few

inches day by day by the scum-cock, while it floats near the surface, or by the blow-off cock when it has settled at the bottom. If, however, this flourey deposit is allowed to accumulate and thicken the water it will produce priming, the same process which is apt to take place in boiling a saucepan of milk or of water thickened with flour.

The second great danger which it involves is that, lying in a mass upon the furnace plates, it may prevent the steam from rising, and thus, the water being lifted on the top of the deposit by the steam held beneath it, the furnace is left without protection, and is liable to be overheated and to collapse by the pressure of the steam. However, these particular dangers may be averted, as already indicated, by due care, without which no scientific appliance is of any avail; and, touching this point, I may quote Mr. Michael Reynolds, the author of several excellent engineering works. After inculcating care in various ways, he says, in his practical and significant style: "Any boiler can be made sensitive and hard to manage. Fire it on no system, feed it with water just as the lead plug is in danger, and fill it to the whistle, and your boiler will one day give a big kick." Many a big "kick" it may be added, has been occasioned by want of ordinary attention to well-known rules. The difficult problems that corrosion and scale have presented to engineers and chemists are evinced in the number of patents that have been taken out for chemical compounds to solve them. Hundreds of these compositions have been put into the market, and the number is still increasing—a proof, perhaps, that no panacea has been discovered, although many preparations are still in use by different engineers. These compounds have in truth become so numerous that every new one is looked upon as another nostrum, and perhaps by the majority of interested persons it is not credited even with the virtues it may really possess. The chemical laboratory has been ransacked in vain for an absorbent of oxygen that will stop corrosion, or an alkali that can be applied without the risk of causing priming.

**The New York Bureau of Labor
Statistics.**

The American Mechanist, of this city, charges the State Bureau of Labor Statistics with inefficiency. It points out the very excellent results accomplished through similar official machinery in other States, and instances abuses in our own commonwealth which need to be corrected, and probably would be if they were taken in hand by the Labor Bureau. Says the Mechanist:

"Upon the correct information furnished by the Pennsylvania bureau, the truck pay system was abolished by law, and wages in that State must be paid in cash. In this State the truck pay system still flourishes. One skinflint mining company that employ some thousands of hands require their workmen to take 80 cents of every dollar of wages in 'store pay' and rent of log cabins, then charge much more for the goods than they are worth. As many of the men get but 80 or 90 cents a day, their condition may be imagined. The company own a railroad 34 miles long, at one extremity of which are the mines. Before they introduced the store pay system they paid their workmen in checks, requiring every check to be presented to be cashed at the bank by the person to whom it was drawn. This necessitated a journey over the road its whole length, involving the loss of a day's time and the expenditure of \$5 for a ticket to go and return over 34 miles of railroad. We mention this example to show the need of collecting and reporting facts regarding labor, in order that evils may be corrected. The people of this State want an efficient commissioner of labor statistics, and the incubus now in that office should either retire or be removed."

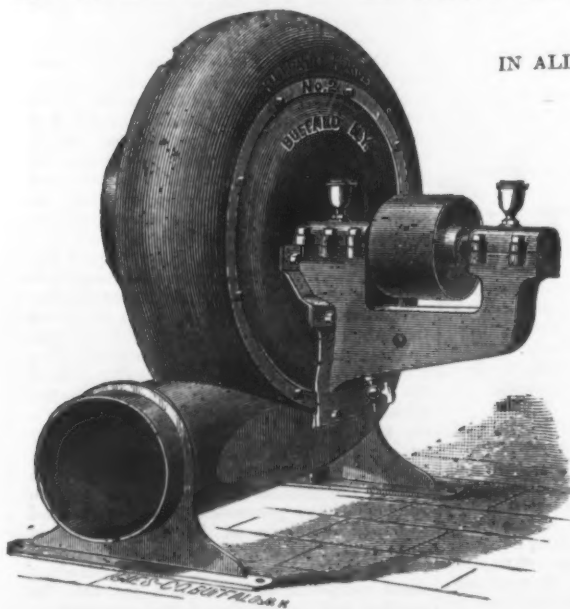
If the facts are as stated by our contemporary, there is certainly a necessity for vigorous work by those who have been placed in charge of the labor interests of this State. The position of commissioner should not be a sinecure, but should be filled by a conscientious person fully capable of dealing with the delicate questions arising from the relations of capital and labor, having neither prejudice against the one nor an undue desire to please the other, but quick to discern evidences of unjust treatment by employers of those who have to toil laboriously for their daily bread, and prompt to lay the proofs before the Legislature for remedial action.

Novel Method of Strengthening a Bridge Pier.—When the Chestnut street bridge over the Schuylkill River, at Philadelphia, was built, a score of years ago, the foundations of the land piers were laid on piling, and not upon the bed rock, which at this point is about 50 feet below the surface. The soil is a clayey mud, and almost from the very beginning this slippery mass slid gradually year by year, carrying with it the piles and heavy stone pier above. The stone-work shows cracks and fissures, and the settling of the ironwork is apparent. In the hope of preventing any further sliding, a novel plan has been devised, which consists of sinking four cylinders at an angle of 45° and extending from the rock to the foundations of the pier. The cylinders are of 1/2-inch wrought iron, 8 feet in diameter, and when completed and in place they will be filled up solid with concrete. They are built underground, each segment being about 3 feet long and 2 high, backed by heavy angle iron on all sides, to allow of bolting together. The scene of operations underground is reached through an iron shaft leading to the surface and covered by an air lock. To prevent the influx of water, operations have to be conducted in compressed air.

The ship Albert G. Ropes, of New York, was launched at Bath, Me., on the 23d ult. She is 258 feet long, 44 feet 7 inches wide and 29 feet deep, and is of 2460 tons burden. She is owned by the builders, I. F. Chapman & Co., and Albert G. Ropes and Capt. D. H. Rivers, of Stoneham, Mass., the latter to be her commander. She cost \$125,000, and is the largest ship ever launched from Bath. She is intended for the California trade.

* From a paper read before the British Society of Arts by Mr. G. S. King.

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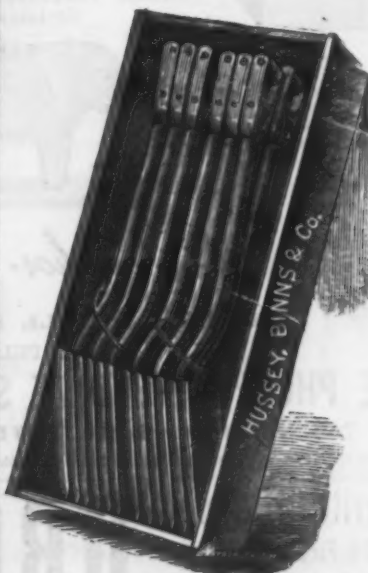
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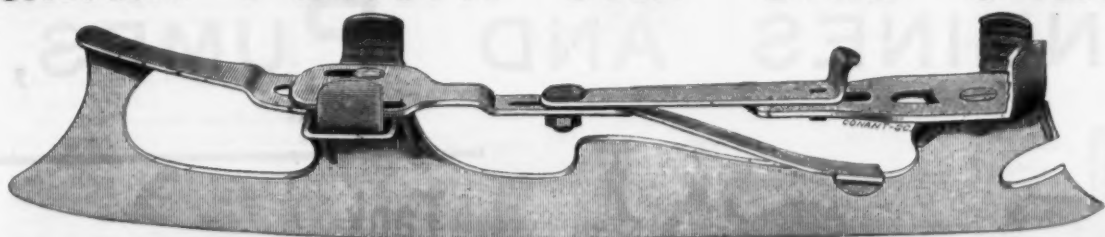
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New Inventions.

A machine for making eye-bolts, eye-rods and screw-eyes from metallic rods or bars has been patented by A. S. Goodell, of Rockford, Ill. The machine consists essentially of a disk which revolves by a shaft and carries a radial jaw and a center pin. Opposite one face of this disk a fixed jaw is secured to the machine. The end of the bar from which the eye is to be made is brought to a welding heat, and is then placed between the inner ends of the jaws and the center pin, its end resting against a weighted gauge. When the disk is revolved the end of the bar is grasped between the movable jaw and the center pin and wound around the latter. The further movement of the disk will weld the end of the rod to the shank portion of the eye by compression between the two jaws. By the reverse movement of the disk the completed eye may be removed, and the parts are then in proper position for a second operation. For each machine a number of center pins of various sizes can be used, so that eyes of different diameters may be produced.

C. M. Fairbanks, of Lincoln, R. I., proposes to cut three-cornered files in a novel manner. These files become practically useless when the edges are worn, and the object of the new process is to obtain better edges. Heretofore the edges were cut before the faces, and this, it is claimed, had the effect to give to the edges ragged points instead of regular teeth. Mr. Fairbanks therefore proposes to reverse the order of cutting—that is, to first cut the faces, then remove the burr, and finally cut the edges. In this way, he says, strong, perfect and durable teeth are placed where they are most needed.

W. Gardner, of Lancaster, Ohio, constructs the metal brands which extend around the periphery of wooden hubs in the following manner: The brand is concave upon its inner periphery, and upon each side of this concave a wedge-shaped edge is formed by the inclined sides of the band. After the band is placed over the hub as far as it will go, it is forced down into the fibers of the wood by hydraulic or other pressure until its outer surface is flush, or nearly so, with the surface of the hub. It should be understood that no grooves are previously made in the hub to receive the band, but the hub is first placed on end and the band afterward slipped over. The wedge-shaped edges cut their way into the fibers and drive them compactly into the space formed by the concave. Thus, when the band is driven in place, it will firmly hold itself in position.

A smoke-consuming furnace has been patented by W. G. A. Heiser, of Berlin, Germany, in the United States and several European countries. The invention has reference to the furnaces of steam boilers, &c., in which the fuel is utilized in a higher degree by coking it before conducting it into the combustion chamber proper. One or more coking chambers are arranged transversely, or parallel to the combustion chamber, from which the fuel is conducted along an inclined grate extending from the coking chamber to a horizontal grate in the combustion chamber. The coking chamber is separated from the combustion chamber by a wall extending downward from the top. The air necessary for combustion is conducted to the furnace through suitable air channels above the grate. The separating wall of the coking chamber is provided at its inner surface, facing the coking chamber, with vertical ribs or projections by which the passage of the gases from the coking chamber to the combustion chamber is facilitated.

A flanging machine patented by H. W. Shepard, of St. Louis, Mo., consists of a horizontal support or table with a hollow die above and a former below. The plate to be flanged is placed on the table beneath the die. The former then works upward through an opening in the table and strikes up the flange. This former consists of a rounded head attached at its center to an eccentric spindle. The motion imparted to the former is not only an up and down motion, but also an eccentric or sidewise motion, so that it forms the flange by travelling horizontally in a circle. In this way the former is only in contact with one point of the flange at a time. The advantages claimed for this arrangement are that the operation can be rapidly performed, that the former is but little injured, and that the metal is less liable to be chilled than when the entire periphery of the former is pressed at once against it.

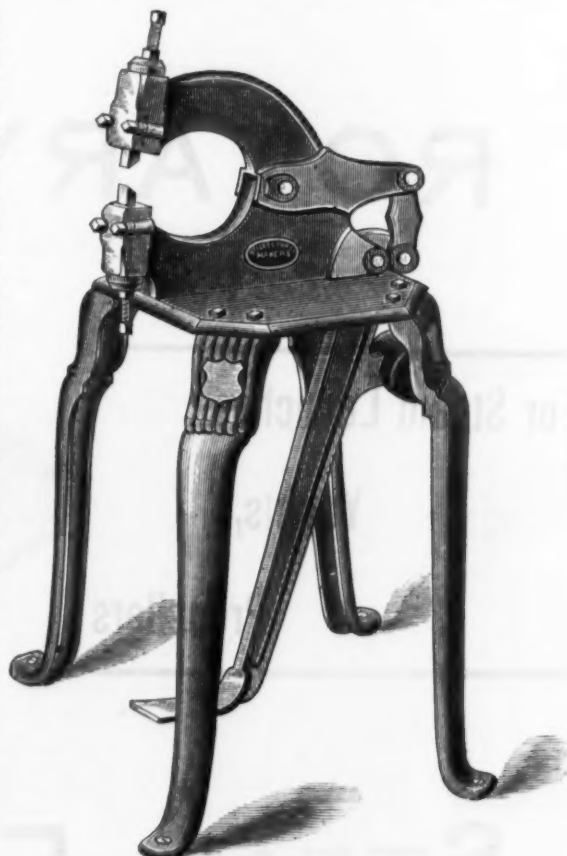
A riveting tool which has the operating face of the cavity of the set at an angle of from 10° to 40° with the axis of the cavity has been patented by A. F. Clinch, of York, Pa. This construction is devised so that the direction of the face shall be at an angle toward the axial line of the rivet. The rivet, heated to a welding heat, is placed in the rivet hole of the plates in the usual manner. This hole is formed in each plate separately, so that when brought together the sides of the holes shall bevel in opposite directions. The holding-on sledge is then placed and held in position under the original head of the rivet. The free end of the rivet is then upset by a few blows, after which the cavity of the set is applied to the upset end, and the set is driven down by repeated blows until the face of the set has nearly reached the top plate. The set is then removed, and the end of the rivet is again upset with a hammer, so as to increase its diameter, after which the set is again applied and driven down, and these opera-

tions are repeated until the face of the set comes in contact with the plate, which completes the operation.

A boiler furnace claimed to give an increased quantity of heat has been invented by W. Love, of Bridgeport, Conn. The products of combustion, including the unconsumed gases, pass over the bridge wall into a heating or mixing chamber. Here they are mixed with hot air admitted through two passages. One of these passages leads upward from the air-box between the fire-box and the front wall of the heating chamber. The other passage extends back of the rear wall of the heating chamber, and opens at the top of such chamber. In this way the products of combustion are brought in contact with two independent air currents entering respectively over and under the volume of gases, so as to thoroughly mix with them and produce perfect combustion. From the mixing chamber the gases enter two passages which conduct them directly under the heating surface of the boiler.

Brass-Founders' Sprue Cutter.

The annexed cut represents a sprue cutter built by the Stiles & Parker Press Company, of Middletown, Conn., and designed expressly for brass foundries and britania manufacturers, for cutting brass and other soft-metal castings from gates. The cutter is operated by a foot lever, thus enabling the operator to use both hands in guiding the work to be operated upon. The frame has ample space—No. 1, 6 inches, and No. 2, 8 inches back from the cutters—and is very narrow across the throat, so that long castings, whether set square or at any angle with the main gate, can be cut off as readily and perfectly as those of smaller dimensions. The cutters are made from 1 x 1/2 inch tool steel, requiring no forging except to form the cutting edges, and are adjusted by screws to compensate for wear and grinding. When properly adjusted it is impossible for the cutters to be brought into contact with



Brass-Founders' Sprue Cutter.

each other, so as to injure their cutting surfaces. Made in two sizes and with or without legs, as desired. No. 1 will easily cut off brass gates 1/4 inch square. No. 2 will easily cut off brass gates 1/2 x 1/2 inch.

We have received from the South Boston Iron Works a well-executed photograph of the remains of the heavy gun which was "lost" in casting in July last. A description of the accident was published in our columns at the time. It will be remembered that the flask holding the heavy casting broke apart at the bottom, and naturally the mass of 120 tons of molten iron settled around the bottom of the flask in the pit. It was necessary for the works to lift this out—first, that they might have the use of the pit to cast another gun, and second, that they might utilize the iron in some way. Including portions of the flask, the mass as it now is would weigh nearly 150 tons, and, as it was in a pit with a somewhat irregular surface, it required a power of 500 tons to raise it away from the brickwork with which it was surrounded in the pit. This was accomplished, says Mr. W. F. Hunt, the president of the works, and the mass raised more than 40 feet, by means of hydraulic power. The power was fastened to the mass by 12 2-inch iron rods tapped into the iron casting and connecting with heavy wooden trusses above. The hydraulic rams raised the trusses. The photograph of the mass was taken, of course, after it was raised from the pit, and it represents a huge cylinder, with a slight resemblance to a cannon projecting from the top. It is an excellent pictorial illustration of a bad accident.

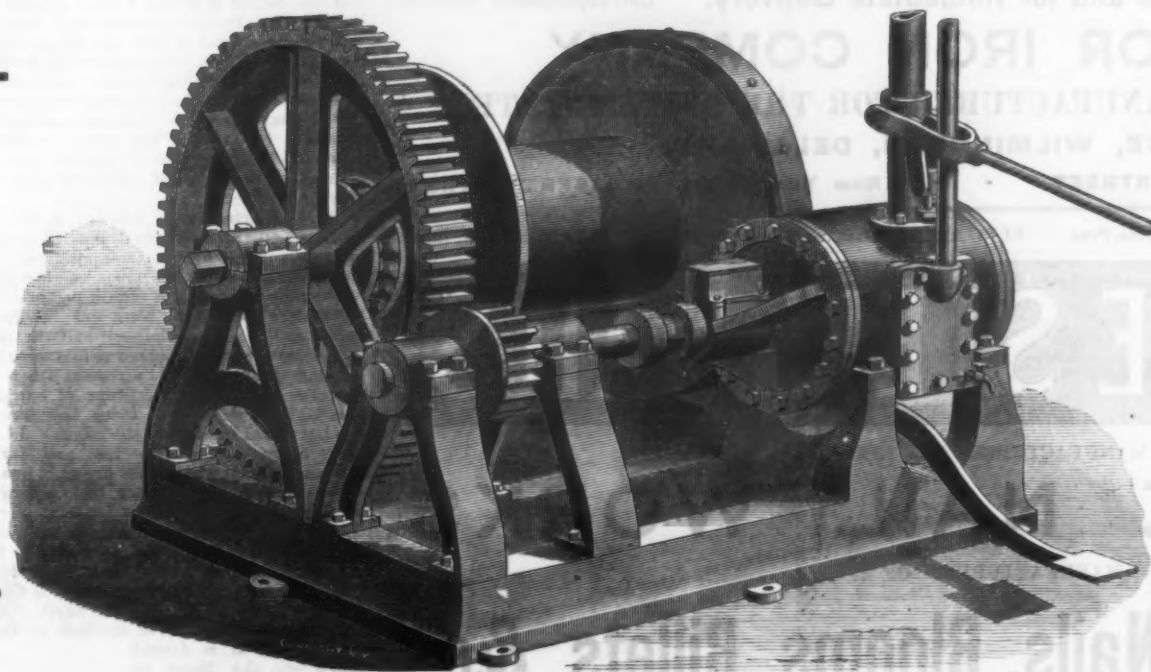
According to Russian papers, an analysis of the Donetz coal has lately been made at Odessa, with the object of ascertaining its value in comparison with Newcastle coal. The Russian coal was, it is said, taken at random, while the English coal was most carefully selected from the best classes. The experts were Russians and Englishmen. The experiments, it is stated, proved that the Russian coal is in no way inferior to English for use in forges, and that for steam engines its volatilizing power exceeds that of Newcastle coal by 10 per cent.

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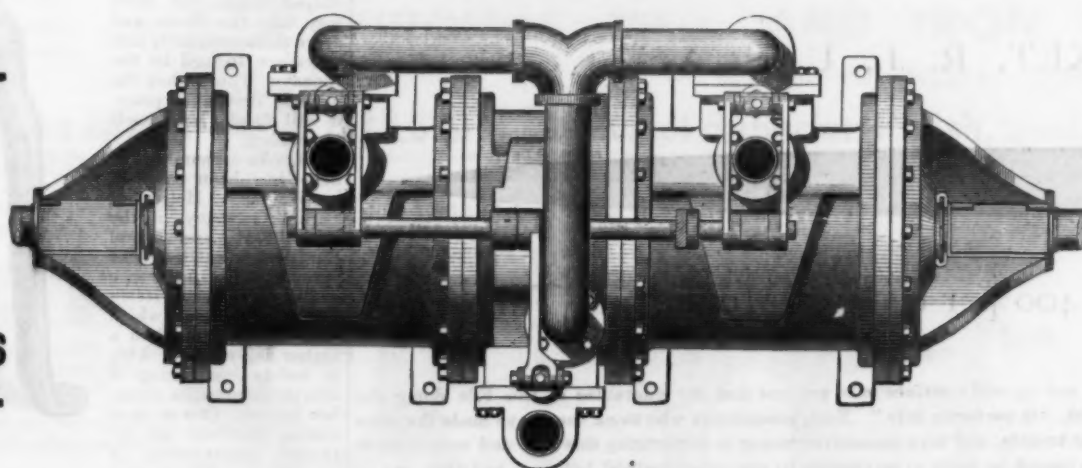
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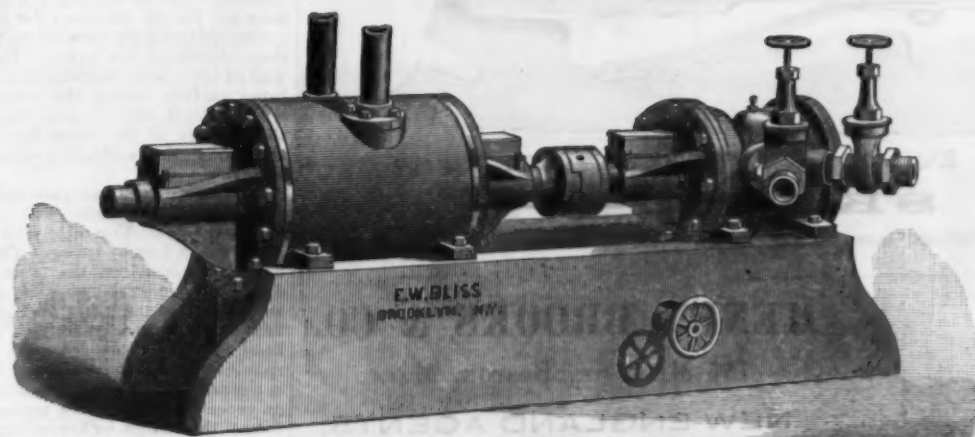


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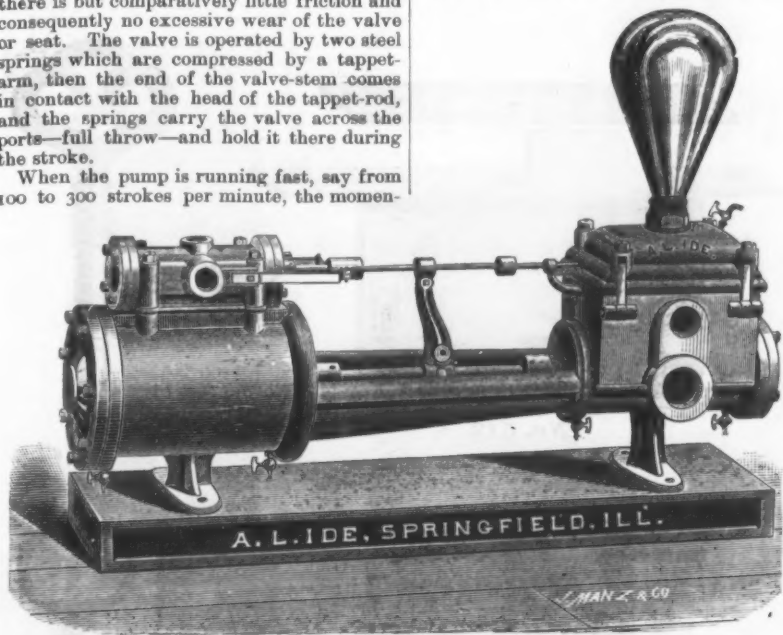
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Ide's Steam Pump.

The accompanying engravings illustrate a new steam pump by Mr. A. L. Ide, of Springfield, Ill. One of the principal claims in its favor is that of simplicity, the pump having but one plain valve and two steam ports. The valve being balanced, there is but comparatively little friction and consequently no excessive wear of the valve or seat. The valve is operated by a tappet-arm, then the end of the valve-stem comes in contact with the head of the tappet-rod, and the springs carry the valve across the ports—full throw—and hold it there during the stroke.

When the pump is running fast, say from 100 to 300 strokes per minute, the momen-



Ide's Steam Pump.—Fig. 1.—Perspective View.

tum of the piston carries the tappet-head directly against the end of the valve-rod and forces the steam valves across the ports, always giving a full open port of live steam, which arrests the momentum and makes it impossible for the piston to strike the cylinder-head under any circumstances.

Fig. 2 of the illustrations, representing a longitudinal section of the pump, shows the arrangement of the water passages, which are of ample proportions, so as to diminish the resistance to the flow. Fig. 3 is a cross-section of the steam and water cylinders, showing Ide's expansion steam packing, by means of which the rings are caused to bear with an equal pressure in all directions, thus keeping the cylinders perfectly round and the piston always in line with the stuffing-box. The packing may be set out by slightly loosening each of the follower bolts, and then applying the key to the pinion stud, giving it a partial turn to the right. The follower bolts are then again tightened. The left-hand cut shows the large direct water ports and easy access to the water-valves.

Driving by Friction.

For many purposes for which gear wheels were formerly used surface friction wheels are now employed. If the surfaces are properly matched as to material, and are sufficiently large as to area, there appears to be no reason why friction wheels cannot be more extensively employed than they have been heretofore. One of the objections, as remarked in an exchange, has been that there must be an end thrust, which by its friction absorbs much of the power. It is a baseless objection, as may be seen in the friction clutch of the overhead counter-shaft of the lathe, and in many other situations where the release of the friction is the easiest and most natural movement. To be sure, in this case the amount of contact is very large—the entire circumference of the pulley—but the principle is the same; for where the pulley friction clutch must be held as a one with the moving pulley, so the friction wheels are one so long as they are in contact, and their contact is a mere point against the circumferential contact of the pulley clutch.

An objectionable method of employing the friction driving is to use a metallic surface against a wooden or a leather surface; two surfaces of wood are better; but if iron and leather or iron and wood are used together, the driver should in all cases be made of the softer material; for when the driver is thrown into contact with the driven, it must make a number of revolutions before its contact will be sufficient to start the driven wheel. It is evident, therefore, that, if the driver is of iron while the driven is of some other substance, it (the driver) will wear a crease that will injure the surface of the driven wheel. It is much better, where it is practicable, to make both the driving surfaces of wood.

Excellent wheels are made of maple—hard rock maple—and of lignumvite, the lignumvite wheel to be the driven and the maple the driver. The wheels should be a cast-iron spider made to receive the wood, which should be sawed into wedge-shaped or radial

the advantages of friction wheels over cogged wheels is that when they are started there is no shock, but only a gradual coming up to speed. Another is their noiselessness; but the epicycloidal cutting of gear teeth latterly has made this objection untenable, as gears can be run as silently as belts. But a great advantage is the very slight move-

bolt head are in the rough state; thus it will be seen by the rule that a nut or bolt head for a 1-inch bolt should measure $1\frac{1}{2}$ inches. For a finished hexagon bolt head and nut the rule is $1\frac{1}{2}$ times the diameter of the bolt plus $\frac{1}{4}$ inch, and the nut and bolt head should thus measure $1\frac{3}{4}$ inches.

The writer some time ago furnished drawings for a complete set of wrenches of the drop-forged system, and the sizes given were for bolts from $\frac{1}{4}$ inch to 6 inches inclusive. A large number of the wrenches were milled exact to size, case-hardened and placed upon the market, and the undertaking brought to light the astonishing fact that of all the manufacturers of hexagon bolt heads and nuts in the United States not one can be found who manufacture nuts and bolt heads according to the rule as given by the Franklin Institute. Messrs. Hoopes & Townsend, of Philadelphia, in their catalogue state that the nuts on pages 20 and 21 are United States' standard sizes and have been adopted as standard by several of the most prominent railroads. Pages 20 and 21 give sizes of bolts and nuts: from $\frac{1}{4}$ inch to 3 inches, the list including cold-punched, chamfered and trimmed nuts; also cold-punched nuts for cars and unfinished work. It is to be borne in mind that the manufacturers state that they are United States' standard sizes. If the rule of $1\frac{1}{2}$ times the diameter of the bolt plus $\frac{1}{4}$ inch be correct, how is it that Messrs. Hoopes & Townsend, as well as all of the manufacturers of nuts and bolts, make their product $\frac{1}{4}$ inch larger, and distinctly state that the thread and outside of each bolt head and nut are made to an accurate gauge and to the standard adopted by the United States Government? What are mechanics to understand by these statements? Do goods manufactured $\frac{1}{4}$ inch over size mean that they are to be classed with articles manufactured $\frac{1}{4}$ inch less in size, which is the true size.

Page 42 of their catalogue gives proportions for United States standard screw threads and nuts. Taking from their table a bolt of 1-inch diameter, it is shown that the width of the parallel sides of a nut are $1\frac{1}{2}$ inches; according to the Sellers or Franklin Institute system it should be $1\frac{1}{4}$ inches. Take, again, the list of sizes as given on page 7, which, by the way, are stated to be standard sizes of heads for bolts—it will be noticed that the word standard is affixed to everything on this page— $1\frac{1}{4}$ inches is given for the size of nut for a 1-inch bolt. This is correct. What does this mean? Perhaps Messrs. Hoopes & Townsend will explain what the word standard means. Haswell's pocket edition for mechanics and engineers for 1870 gives on page 123 a list of sizes of nuts and bolts from $\frac{1}{4}$ inch to 6 inches inclusive. This list gives as a rule $1\frac{1}{2}$ times the diameter of the bolt for the width of the nut, and hence by this rule we have another size of nut. On the next page Mr. Haswell gives the sizes of screw threads, bolt heads and nuts as per rule of the Franklin Institute. Why Mr. Haswell gives two sizes of nuts for the same bolt is a mystery to the writer. The sizes thus shown in this edition are $1\frac{1}{2}$ and $1\frac{1}{4}$ inches

Standard Sizes for Hexagon Bolt Heads and Nuts.

The following communication from C. E. Simonds, East Cambridge, Mass., appears in *Mechanics* for November:

The advantages of a system by which cer-

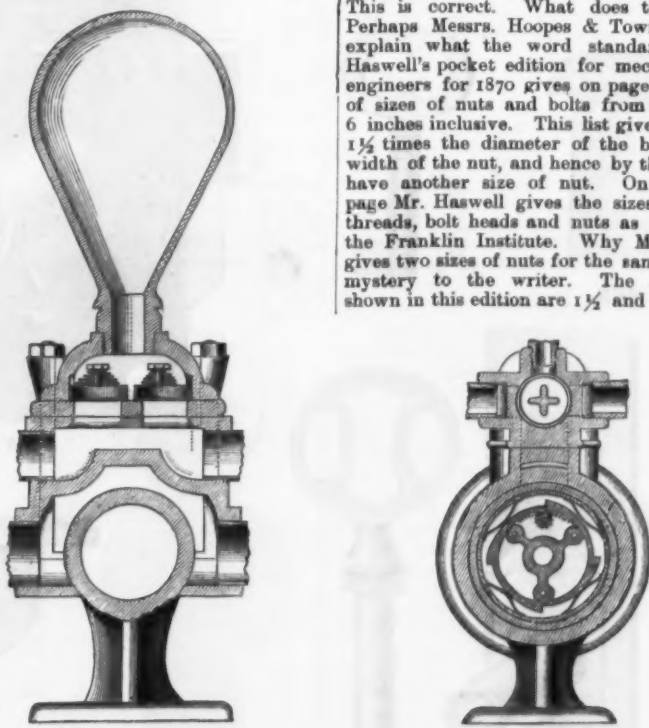


Fig. 3.—Cross-Section of Steam and Water Cylinders.

tain classes of machine-work can be constructed and placed upon the market are of untold value so long as the product is constructed according to the rule given. Adopting a rule is one thing, but universally working to it is another matter. On December 15, 1864, a system of bolt heads and nuts, as well as screw threads, was recommended and adopted by a committee of the

for a bolt of 1 inch diameter. In the revised edition for 1884, page 157 gives $1\frac{1}{2}$ times the diameter of the bolt for the width of the head, and $1\frac{1}{2}$ times the diameter plus $\frac{1}{4}$ inch as the width of the parallel sides of a hexagon nut. Rather poor information to be found in a revised edition. Mr. Trautwine in the revised edition of his pocket-book gives as a rule $1\frac{1}{2}$ times the diameter of the bolt for the width of the parallel sides of a hexagon bolt head and nut, and he says that some machinists add $\frac{1}{4}$ inch to this for all diameters of bolts. The word some is very amusing, taken as it is from the pages of a work devoted to the interests of mechanics.

In *Mechanics* for March 18, 1882, a correspondent asks for information regarding the sizes of standard bolt heads and nuts of the Franklin Institute system, in which he feels sure that it would be conferring a great favor upon many readers, and would at the same time enlighten many workmen who are not posted upon the subject. The sizes, as well as the information thus given, are taken from the revised edition of Mr. Nystrom's pocket-book, and it is stated that the sizes are those of the Franklin Institute system, which, by the way, is not the case, inasmuch as the sizes given are $\frac{1}{4}$ inch over size. At the end of the article it is stated that the workman should bear in mind that these dimensions are finished sizes, and are intended for use on either black or bright work; and, furthermore, that the same size wrench will fit either finished or unfinished bolt heads and nuts. The *Scientific American* Supplement, No. 443, page 7072, for June 25, 1884, contains the best and only correct table ever published. To the railroad master mechanic, master car builders and mechanics in general the questions arise, Is it possible to ever correct the error which has existed for a period of over 20 years? Is it not best to drop the word standard, and forget that there was ever such a word? It looks something like counting chickens before they are hatched. We have got the word standard, but where are we to find the nuts or the manufacturers who know what the standard is and who work to it?

NEW PUBLICATIONS.

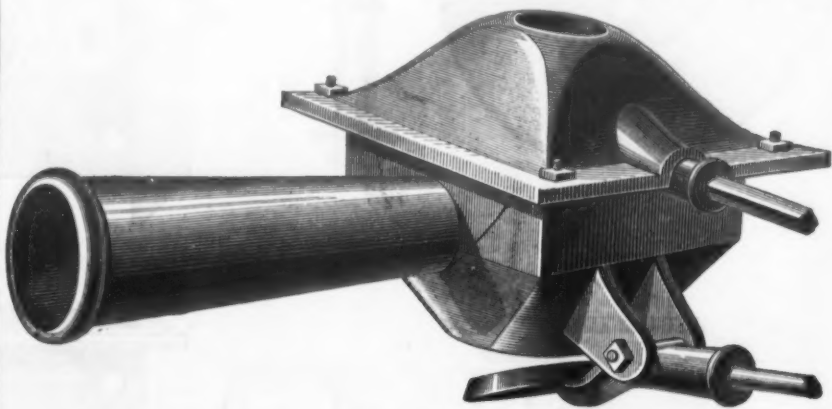
THE STEAM ENGINE INDICATOR. By William Barnet Le Van. Size, 6 x 4 inches, 169 pages. Published by D. Van Nostrand. Price 50 cents.

Mr. Le Van's little work is made up of a series of articles prepared some time since for the *Mechanical Engineer*, and was designed, as the author states, as a guide to practical working engineers. In attempting to carry out the plan originally laid down, and which, as we understand it, was to clearly explain the use and application of the indicator and the deductions to be made, the author has been only partially successful, and the treatise, while extremely elementary in some cases, refers in others to matters with which the class of readers for whom it is intended can scarcely be expected to be sufficiently familiar to warrant such superficial treatment as is given. The book is divided practically into two parts, the first being devoted to observations more or less closely connected with the theory of the indicator, while the second is given up to a description of the instrument and its method of application, the discussion of diagrams, rules for calculating the horse-power, &c.

meeting, 1883, and the Pittsburgh meeting, 1884, has been issued, and, as regards interesting and valuable reading, will compare most favorably with preceding issues. It is accompanied by a table of contents and general index for Vols. I-V.

Filley's "Diamond F" Slotted Ball-Valve Tuiere Iron.

The particular advantages claimed for this tuyere iron are that it gives a strong and steady blast, thus producing a clear, bright fire; that it does not clog or choke up, that it does not freeze up, and that cinders will not adhere to the top plate. Referring to Fig. 1, it will be perceived that the tuyere has a very heavy movable top plate, which can be replaced when burned out. The ball shown in Fig. 2 presents a perspective view of the valve inside the chamber, and is attached to the rod shown in Fig. 1, by which it can be revolved. When it is desired to clean the fire a gentle blast is kept up and the cinders are broken, after which the upper rod at the side of the forge is given a quick semi rotary motion, clearing the dust



The "Diamond F" Tuyere Iron.—Fig. 1.—Perspective View of Tuyere.

This part, while good so far as it goes, has not been treated as fully as its importance demands, and some matters, such as, for example, calculations of steam consumption, might have been very appropriately embraced without unduly increasing the size of the book. As it is, it will very probably prove a convenient source of information in some quarters, but still there is room for improvement, and it is to be hoped that a subsequent edition will supply what is now lacking.

THE YOUNG ENGINEER'S OWN BOOK. By Stephen Roper. Size, 4 x 6 inches, 353 pages. Published by Edward Meeks. Price, \$2.

Even superficial examination of the little work now before us tends to show that the treatment of the subject has been such as to make it specially adapted to the wants of the beginner, and, while the general arrangement and execution might in some instances have been easily improved upon, the value of the book, in its field, cannot be doubted. There are no formulae to confuse the young reader, and the different subjects taken up are presented in a manner so elementary that no difficulty whatever can be experienced in understanding them. In his attempt to confine the matter within the narrow limits necessarily imposed by a work of this kind, Mr. Roper unfortunately left some subjects incomplete and less developed than their importance required, and on the other hand has, we think, given undue attention to some minor matters. Notwithstanding its defects, however, the book will very probably be favorably received, and its careful perusal will prove of no little benefit to the young practical engineer.

STEAM BOILER INCURSTATIONS. By Charles Thomas Davis. Size, 9 1/2 x 6 inches, 150 pages. Published by the Industrial Publication Company. Price, \$2.

Mr. Davis's book is interesting in many respects, and furnishes a large amount of information which cannot but be gladly welcomed in many quarters. It was with a view to supply reliable particulars as to the various compounds and mechanical apparatus employed for the prevention of incurstations that the book was compiled, and the author, we think, has, on the whole, been successful. The book is made up of five chapters. The first is devoted to general remarks concerning the incurstation and corrosion of steam boilers; composition and properties of water; the effects of water on boilers, and preventions to corrosion of marine boilers. Chapter II gives methods of determining the constituents and hardness of water. Chapter III takes up the purification of water for

and cinders from the opening, they being finally removed from the tuyere by lowering the bottom valve. In Fig. 3 is presented a sectional view of the "Diamond F" tuyere. The ball-valve is placed eccentric to the upper face of the chamber, and by revolving the ball and bringing up each face successively three different-sized openings may be obtained, as is shown by the dotted lines in the cut. The ball valve is so slotted as to increase the difference in the size of the blast opening for each of its faces, thereby greatly



Fig. 2.—Perspective View of Valve.

enlarging the range of work of the tuyere, and making it more suitable for a fan blast. This tuyere iron is manufactured by the St. Louis Malleable Iron Company, of 2108 to 2128 Market street, St. Louis, Mo.

Penetrating Power of Lights.—In a paper on "Electric Lights" M. de Meritons gives some very interesting figures in comparing oil and electricity as illuminants. The figures, he states, are taken from two memoirs by M. Allard. As an example, the light at Dunkirk, obtained from mineral oil, is 6250 candles, which in weather of mean transparency is seen for 53 km.; if this be compared with an electric light of 125,000 candles, it is found that the electric light is seen for 75.4 km. Thus, an increase in the illuminating power of 20 times only increases the penetrative distance 22 km., or 42 per cent. If we now take a less transparent state, the ratio is reduced to an increase from 24 to 32 km., or 34 per cent. Or, lastly, in very foggy weather the distances are 3.7 and 4.6 km., showing an increase of 24 per cent. From these general figures M. Allard has calculated that in foggy weather in the Channel the luminous intensity with oil of 6250 carrels is 3.805 km.; then if this be increased to an oil illumination of 125,000 carrels, the luminous intensity is 4.74 km.; comparing this with an electric light of 125,000 carrels, he finds the luminous distance to be

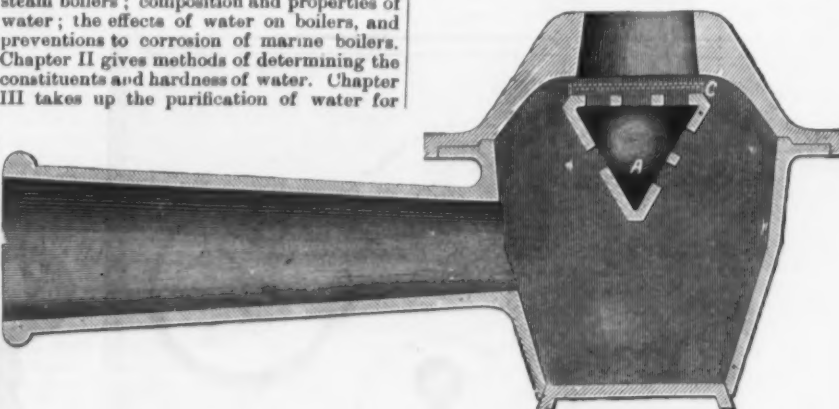


Fig. 3.—Sectional View of Tuyere.

boilers. Chapter IV relates to anti-incrustation compounds, and Chapter V supplies descriptions of the various mechanical boiler cleaners. In addition, there are lists of patents for compositions for preventing and loosening incrustations and for purifying water, and for mechanical appliances for preventing and removing scale, issued by the United States Government from 1790 to July 1, 1884. The work is well illustrated, and will always prove convenient for reference.

TRANSACTIONS OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

Volume V of the above Transactions, embracing the papers read at the New York

4.696 km., or the penetrating power of the electric light is less than 1 per cent. less than mineral oil, while its cost, as computed by both English and French engineers, is from four to six times less than that of oil.

At the Cymmer collieries, near Cardiff, there is a small gas works that contains a feature of interest. A "blower" of gas is conveyed up the shaft by pipes, and is forced into the purifiers attached to the gas works by a steam injector. The gas made is forced down the pit by another injector, and is there burnt for use. A receiver is placed at the pit bottom to separate from the gas the water resulting from the condensation of the injector steam.

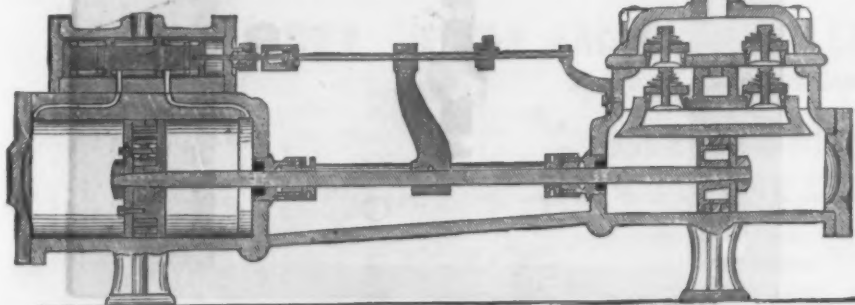


Fig. 2.—Longitudinal Section.

segments, so that the end grain of the wood bears and makes the contact surfaces. Excellent results have been obtained also with hard rubber (vulcanized) and wood, where there was no oil to rot the rubber, and for small wheels there is nothing better than raw hide as prepared for pickers for looms and for small gears. This will stand oil and resist its disintegrating influence. One of

Franklin Institute of Philadelphia, and adopted by the United States Government in May, 1865. It is well, perhaps, to state that this system is known as the Sellers' or Franklin Institute, likewise the United States' standard. The sizes or dimensions of the width of the parallel sides of a hexagon bolt head and nut are $1\frac{1}{2}$ times the diameter of the bolt plus $\frac{1}{4}$ inch when the nut or

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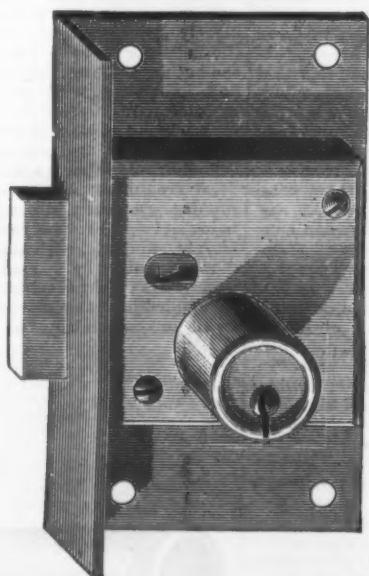
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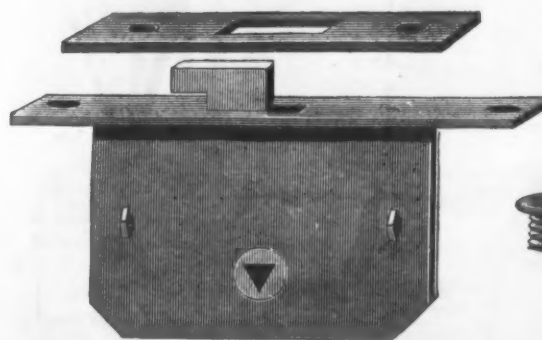
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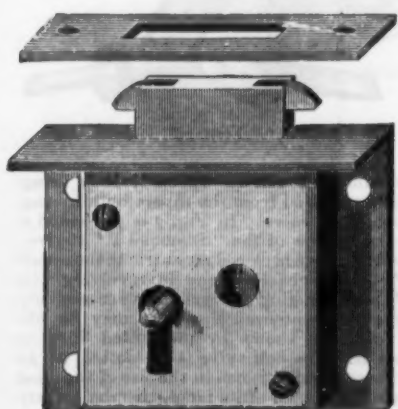
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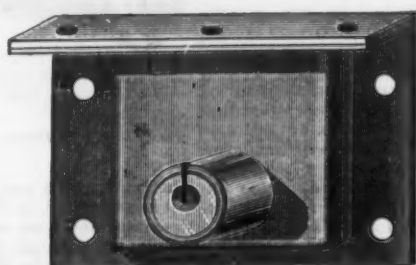
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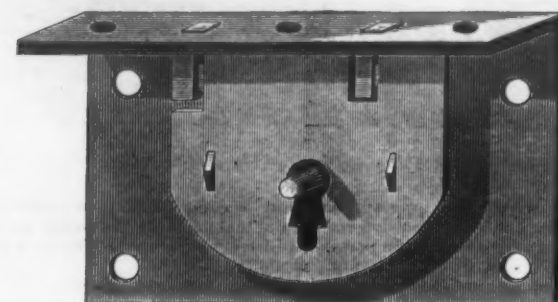
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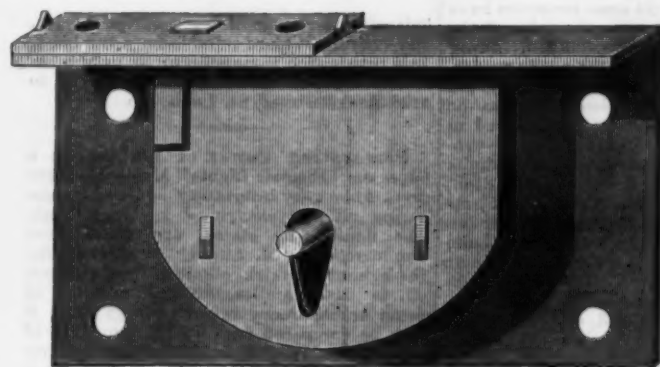
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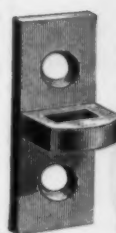
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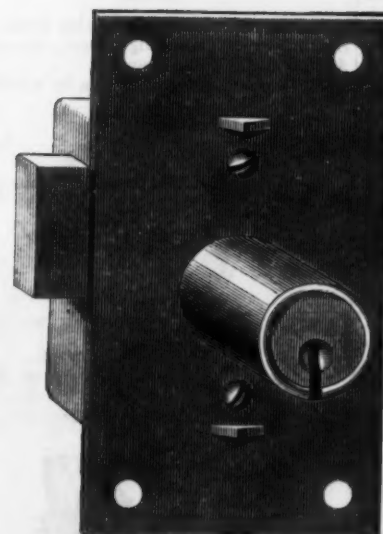
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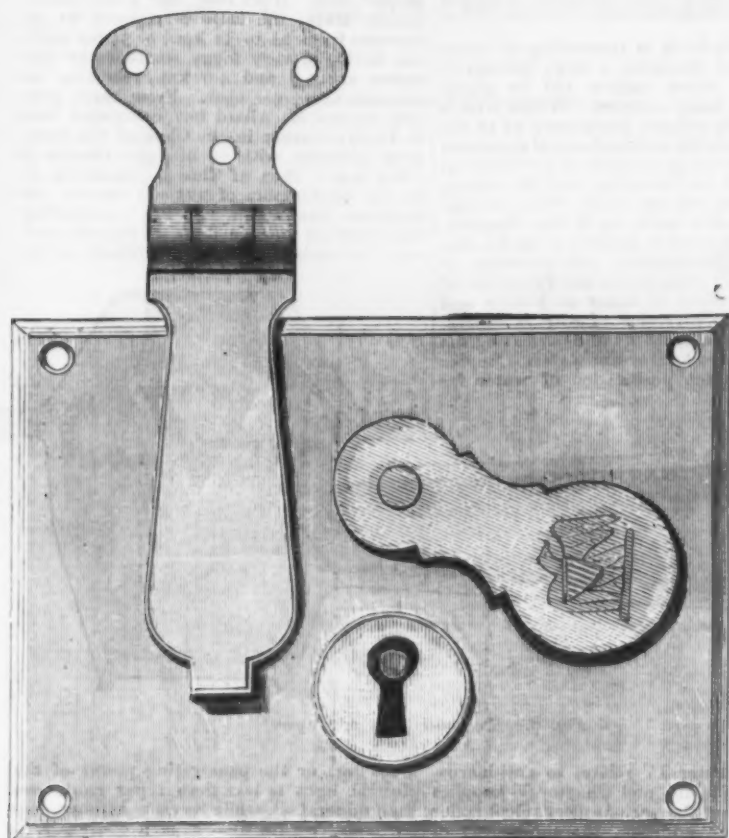
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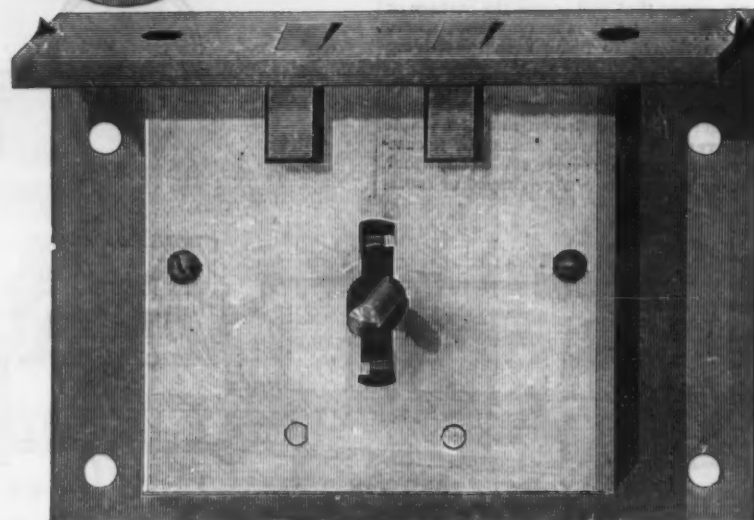
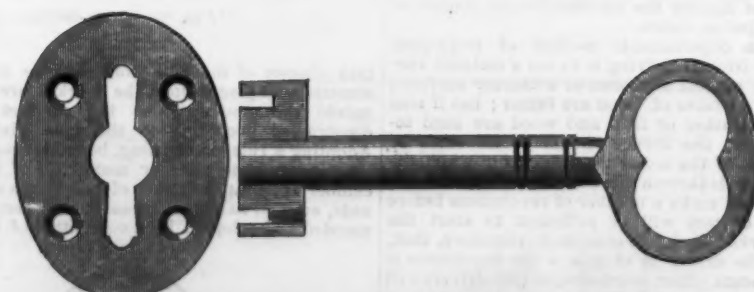
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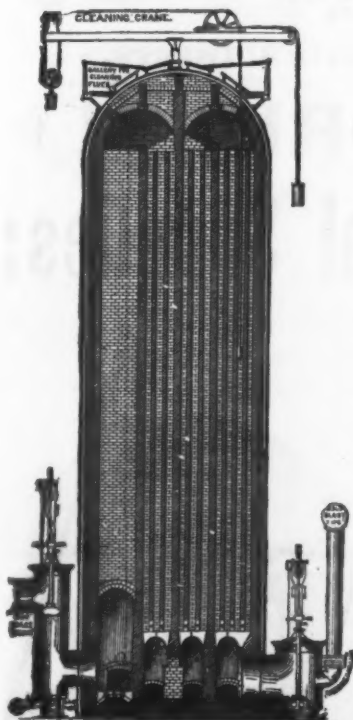
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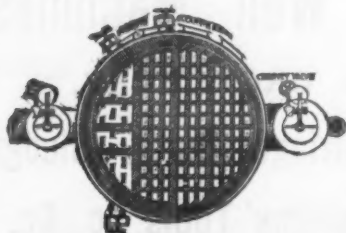
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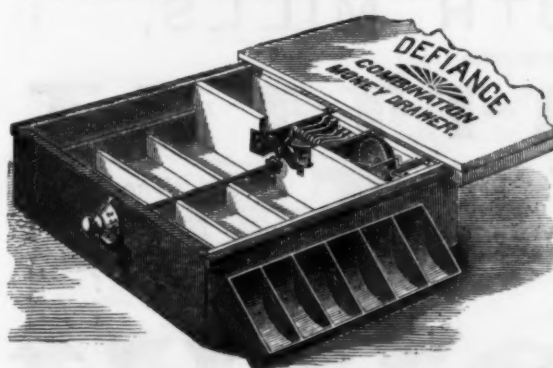
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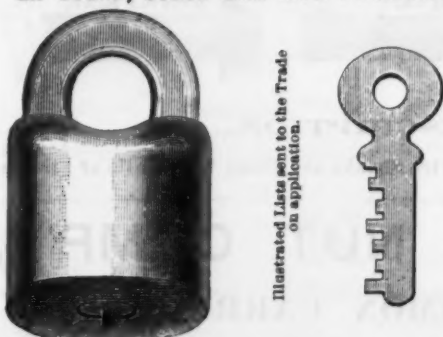
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INDUSTRIAL ITEMS.

MAINE.

The Auburn Steam Power Company, a corporation now forming in Auburn, will, next spring, build a brick block of three or four stories, with room for power shops overhead. Work has begun on the boiler building.

NEW HAMPSHIRE.

The Laconia Needle Company have started their new works at Laconia for the manufacture of hosiery needles of all kinds. D. W. Cox, the originator of the enterprise, has had 25 years' experience, and believes that he can turn out a first-class needle.

MASSACHUSETTS.

The Ames Sword Company, Chicopee, are hard at work on a large order for sabers for the Chinese Government. They are employing more hands than ever before since the company was incorporated, and have promise of enough work from the Chinese Government to keep them busy some months. The Ames Manufacturing Company have received from the Overman Company orders for 100 bicycles the coming year, and for as many as can be made the next year.

CONNECTICUT.

The W. L. Gilbert Clock Company, of Winsted, are running their works full time, but the report is not correct that business is booming with them. They have had their hands do some extra work recently, but not as a whole.

About a year ago the Cheshire Watch Company was formed for the manufacture of a watch patented by A. E. Hotchkiss, of Cheshire. They immediately commenced operations, which have resulted in the completion of a brick factory, 200 feet long, in which they are now beginning to make watches. By the 1st of January they will be running with an increased force, having bright prospects. Since the organization of the watch company Mr. Hotchkiss has formed another company, to be known as the Cheshire Clock Company, for the manufacture of clocks under his patents. The new company was formed October 4th, with a capital stock of \$60,000. A. E. Hotchkiss was elected president, and Charles B. Terrell secretary and treasurer, with a full board of nine directors. Already ground has been broken for the clock factory, which will be located a short distance south of the watch factory, and will be 160 feet long, two stories high, with basement. It will be pushed to completion as soon as possible.

NEW YORK.

The Syracuse Iron Works, at Geddes, have gone into the hands of a receiver. Judgments to the amount of \$25,000 have been entered against the company and satisfied. The real estate and fixtures will be sold upon the foreclosure of a mortgage of \$100,000. It is expected that the company will be reorganized and placed upon a sound financial basis. The causes of the failure are said to be "unremunerative prices and tariff agitation."

PENNSYLVANIA.

Two months ago the Standard Steel Casting Company, of Thurlow, 2 miles south of Chester, started their 10-ton open-hearth furnace. They are now making castings practically free from blow-holes and which can be as readily machined as forged wrought iron. There is still some difficulty in making small, irregular-shaped castings, owing to the enormous shrinkage of cast steel, but this, the owners say, will soon be overcome. They are sanguine that cast-steel wheels will supersede chilled-iron wheels as steel rails did iron rails. Such wheels, it is affirmed, have a life four times as great as chilled-iron wheels and cost but twice as much.

The Cambria Iron Company, of Johnstown, have struck gas in their test well at a depth of 620 feet. The gas is in small volume, as might be expected at that depth, and the well will be drilled deeper.

The Philadelphia and Reading Coal and Iron Company have reduced the time of the employees of their Reading shops to eight hours, and it is possible that some of the hands may be temporarily suspended.

Jones & Benner, contractors, of Philadelphia, are erecting a new iron bridge for the Manayunk Bridge Company, over the canal at Manayunk. It will have one span 135 feet in length.

The daily press has in circulation an item to the effect that Hiram H. Fisher's cast-iron gas and water pipe works, at Allentown, have shut down indefinitely, throwing 85 men out of employment. This is true as far as it goes, but additional facts should be given. Mr. Fisher, who is now in Europe, left orders to stop the works whenever orders slackened off and the superintendent deemed it advisable. As it is too early to commence stocking pipe for next year's consumption, and the works have an ample assortment on hand, the superintendent decided to stop manufacturing at present. But if orders continue to come in as they have done for the last week, it will be necessary to resume operations shortly. Mr. Fisher and his son have been visiting iron works in Scotland and Germany, and are expected home early this month.

Work at the Baldwin Locomotive Works has been falling off gradually since last May. In May and June 1000 men were discharged on account of the lack of orders for locomotives. About 2000 men are now employed, and they are working one-half to three-quarter time.

The mines of the Colvin Coke Company, near Dunbar, Fayette County, are on fire, and it is thought that the flames have been communicated to the Anchor mines adjoining. The Colvin mine has been sealed, but it is thought the only way to extinguish the flames will be to flood the mine with water, and this, considering the present drought, is practically impossible.

In the way of large tools, William B. Bement & Son, of Philadelphia, are just now building a punching and shearing machine for the Keystone Bridge Company, which will punch a 4-inch hole in 1 1/4-inch iron, 3 feet from the edge. The frame of the machine

weighs 23 tons, the eccentric shaft being 13 inches diameter. Shearing blades of different shapes and punches of different sizes can be used. The frame of machine is 10 feet in height. The machine will make 16 cuts per minute. This firm are also building a punching machine for the Baltimore Car Wheel Company, to punch the arm of their car-wheel out of flat bars of steel 1 inch thick. This machine will punch a 5-inch hole in 1-inch iron. The frame weighs 15 tons. Patterns are now also being made in the Bement shops for a lathe which will be capable of turning a shaft 53 feet long. The lathe is 70 feet in length, swings 60 inches, will be double-headed and triple-gear. Weight about 40 tons.—American Machinist.

Another gas strike was made recently on the farm of Howard Morton, at the head of Four Mile Run. The gas was met at the depth of 1700 feet, but the driller was so elated over the heavy flow that, being anxious to get more, he drilled 15 feet further. He went through the sand and struck a heavy vein of salt water. The salt water will be shut off, when it is thought the well will be among the best. It is owned by Messrs. Howard Morton, Thomas H. Phelps and others.

The Isabella Furnace Company are manufacturing mineral wool from slag at their furnaces, and report it as being in good demand.

The Phoenix Bridge Company, of Phoenixville, are now making active preparations for erecting the new iron bridge across the Schuylkill, according to their contract with the Schuylkill Bridge Company, of Pottstown.

The rolling mill and chain shop of the Wheeler Iron Company, at West Middlesex, have been leased by Messrs. Wheeler & Waplington, and will start up as soon as everything can be put in order.

Messrs. McKee, Fuller & Co., of the Lehigh Car, Wheel and Axle Works, at Fullerton, have just completed a large addition to the forge building, which was inadequate on account of their increasing business. They are also having a new furnace and a new steam hammer of 2500 pounds capacity placed in position. The capacity of the forge department will be doubled. The works are at present busily employed on large orders.

McLanahan, Stone & Co., proprietors of the Gaysport Foundry and Machine Shops, near Hollidaysburg, have reduced the working time to nine hours and suspended some of their employees. This was done to avoid a reduction in wages, which would otherwise have been necessary.

Workmen are engaged lining No. 2 Stack of the Stewart Iron Company, at Sharon, preparatory to starting up early in November. This furnace has been idle since August 15.

No. 1 Furnace of the Crane Iron Company was lighted recently, making the fourth furnace at work. No. 4, the remaining idle furnace, has not been in use for a number of years, and will require extensive repairs before it could be operated. No. 1 is the largest furnace of the works, and will largely increase the number of men employed and the output of the works.

Wm. P. Buckley and Edmund Guest, of Pottstown, have entered into partnership, and intend to start up an iron and brass foundry in that town. They are now actively engaged in making preparations to begin their new business.

The new mill now being erected by the Pottstown Iron Company east of their rolling mills, at Pottstown, is rapidly nearing completion, as is also the large foundry which Cofrode & Saylor, of the bridge works of that place, are erecting near the works. By the time that these two places of employment are ready, together with the steel mill works of Ellis, Lessig & Co. and the new foundry of Buckley & Guest, it is thought that there will be quite a demand for skilled labor in Pottstown.

The extensive and valuable real estate of the Kemble Coal and Iron Company, at Riddesburg, Bedford County, which recently failed for nearly \$1,000,000, is advertised to be sold by the sheriff of that county on the 15th of November. It consists of the two blast furnaces, coke ovens, railroads, dwelling-houses and other improvements at Riddesburg, 32 tracts of land, nearly all of which contain coal or iron ore, and the mineral rights in 17 other tracts. This will be the largest judicial sale that has ever taken place in that part of the State. It is intended that the change of ownership shall not interfere with the operation of the works.

The Bridgewater Gas Company's pipe line has been completed to the works of the Hartman Steel Company, at Beaver Falls, and a contract entered into for supplying the steel and wire mills throughout with natural gas. The gas has already been turned into the pipe line, and the supply is assured in large volume. It is brought from the celebrated "Raccoon" wells.

The Reading Foundry Company, Limited, is a new corporation, largely made up of the same membership as the Mellert Foundry and Machine Company, Limited. The new company, however, is entirely distinct from the latter. Arnold Mellert is chairman, and P. D. Wanner is secretary and treasurer. Ten acres of land have been purchased for the use of the new organization, but the erection of buildings will depend upon the condition of trade during the next six months.

The No. 2 Furnace of the Chestnut Hill Iron Ore Company, at Columbia, has been in blast since July 1st, making about 400 tons of neutral foundry pig iron per week. It is shipped to customers as fast as made. No stock is on hand, and the company fall short of filling their orders from 200 to 300 tons per month. They have decided to blow in their No. 3 Furnace, which will make their total output about 600 tons per week.

PITTSBURGH AND VICINITY.

The local stove molders' union, which was badly crippled by the late strike, is to be reconstituted. A meeting will be held early

next week to take steps toward putting the organization on a solid foundation. The manufacturers refuse to recognize the union, and more trouble is expected.

Mr. Ralph Bagley is at the head of a scheme to build a large blast furnace on Neville Island. This will insure the completion of the Neville Island Railroad.—Dispatch.

The employees of H. B. Scutt & Co.'s wire works have agreed to a reduction of 10 per cent., which took effect on October 27. Heretofore they have not been running full time, but will in the future. The firm agrees to restore the wages on April 1, 1885, and to run full time until that date.

Gas was struck in the Canonsburg well on October 30, at a depth of about 1800 feet. Drilling had to be suspended and all the fires put out. The blaze from the pipe, which is run some distance from the well, rises to a height of over 30 feet. An effort will be made to drill the well deeper.

OHIO.

The American Pneumatic Iron Company, of Milwaukee, Wis., and Chicago, Ill., have purchased the Nes Silicon Steel Works property in Sandusky, and will remodel the works and begin the manufacture of bar, band and round iron about April next. The company paid \$30,000 for the property and will expend \$80,000 in making improvements. The works have been idle, with the exception of a few months, for about 12 years. Cleveland parties were negotiating a few months ago for the purchase of this property.

The Lawrence Mill, at Ironton, is running full. The Iron and Steel Mill is still idle.

ILLINOIS.

The Hoyt Brothers Manufacturing Company, Aurora, report business quite fair. They have replaced their old cupola by a new one of 8 tons capacity, and have also added to their lists several iron-working tools, a turret lathe and a new improved planer having as a distinctive feature the traversing of the head the full length of the bed.

The trusses for the new Pacific Boiler Works building, Chicago, will be in place this week, and it is intended to have the structure ready for occupation by December 30.

The Elgin Light Company, of Elgin, have been licensed to organize by the Secretary of State; the capital stock will be \$50,000, and the company will do a general indoor and outdoor electric-lighting business.

The Globe Iron Works, of Chicago, are getting out the ironwork for the penitentiary at Santa Fe, New Mexico.

The Chicago Hardware Manufacturing Company are again increasing their capacity by the addition of new machinery. They report the sales for the past season the largest ever enjoyed by them. Some novel specialties will soon be brought out by this company.

MISSOURI.

The Laclede Rolling Mills of the Chouteau, Harrison & Vallé Iron Company are still idle.

Mr. S. C. Edgar, who is operating the Glendale Zinc Works, has leased the Carondelet Zinc Works for a year, and has already put two of the four furnaces of the latter in operation. The other two furnaces will doubtless be started up as soon as the repairs they are now undergoing are completed. The Carondelet Zinc Works have a daily capacity of about 5000 pounds.

MICHIGAN.

Articles of association of the Ashland Iron Mining Company have been filed with the Secretary of State. The company were organized to operate on the Agogebic range, in Ontonagon County. The capital stock is fixed at \$1,000,000. Cash actually paid in, \$10,000.

MINNESOTA.

The Minnesota Iron Company will make no shipments of iron ore after November 1, and by that date will have forwarded 65,000 or 70,000 tons of iron. Miners will be kept at work all winter getting out ore for the next season. The statement that a new mine—the Lee—had been opened for business, is not correct. The track into Duluth will not be laid this winter.—Duluth News.

TENNESSEE.

The Blaine Draft Plow Company have recently been organized at Chattanooga.

WEST VIRGINIA.

It is reported that a rolling mill will soon be built at Huntington.

CALIFORNIA.

The Shasta Iron Company have been incorporated for the purpose of carrying on a general iron manufacturing business in Shasta County. The capital stock is \$1,000,000, and the directors are A. T. Marvin, John McKewen, Thomas M. Pennel, H. W. Baxter and Geo. E. Booker.

NORTH CAROLINA.

B. F. Rodman has located in Washington and established the Washington Iron Works. He builds new machinery and is prepared for all classes of repair work, and is succeeding well.

ALABAMA.

Aikin & Lighton, proprietors of the Iron City Foundry and Machine Works, of Birmingham, have completed their buildings. The foundry is 50 x 85, of brick; machine shop, 30 x 50, also of brick, two stories, upper story to be used as a pattern shop; blacksmith shop of frame, 18 x 50; engine and boiler room, 20 x 50. They are now putting in a 25-horse-power Lane & Bodley engine, 170 feet of shafting, lathes, planes, drills, emery-wheels and all necessary tools for a first-class machine shop. They will manufacture foundry molding machines as a specialty. Their foundry will be fitted throughout with machines for molding sand weights and railroad castings, such as oil boxes, brake shoes, draw bars, center plates, stake pockets, &c. Their machines are automatic, and not only press the sand in the flask, but withdraw the patterns from the sand with one revolution of the eccentric without the necessity of sponging or rapping patterns, thereby forming a casting true to pattern.

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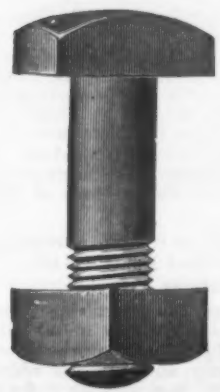
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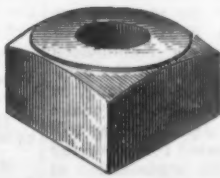
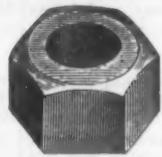
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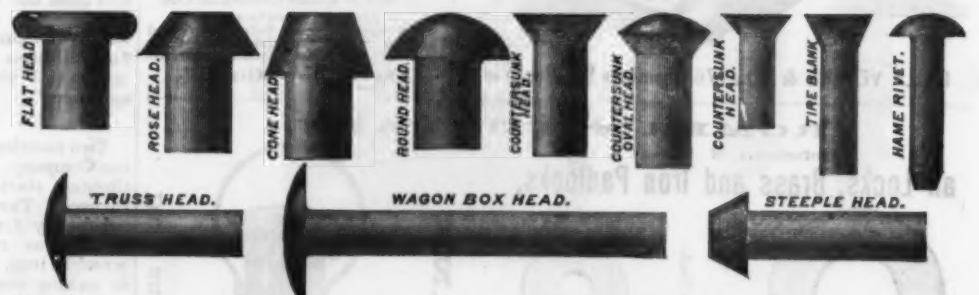
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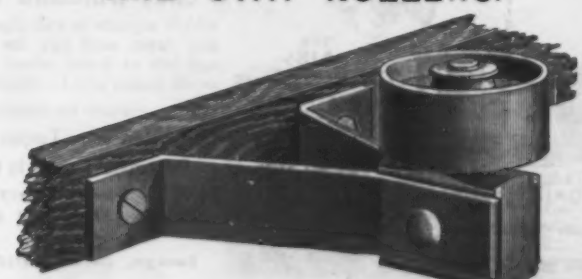
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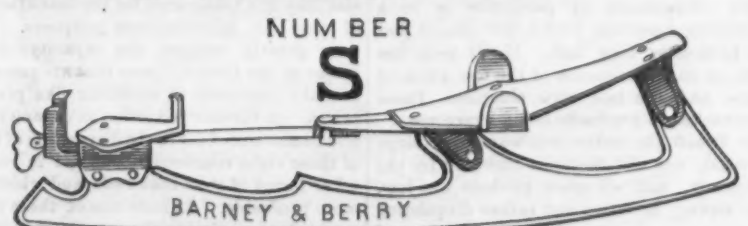
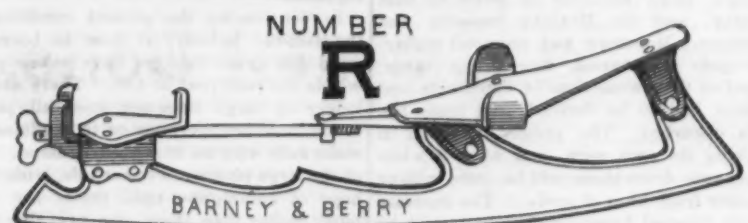
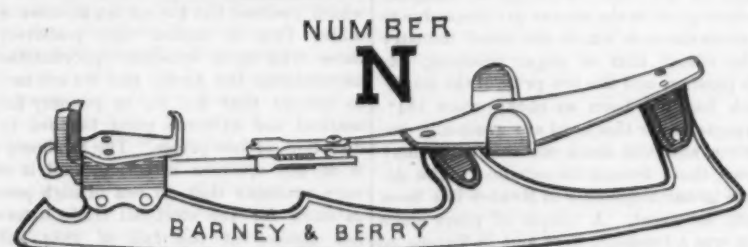
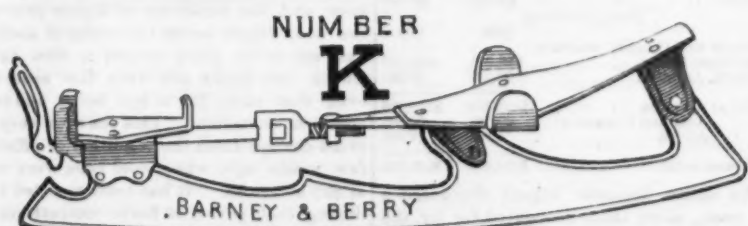
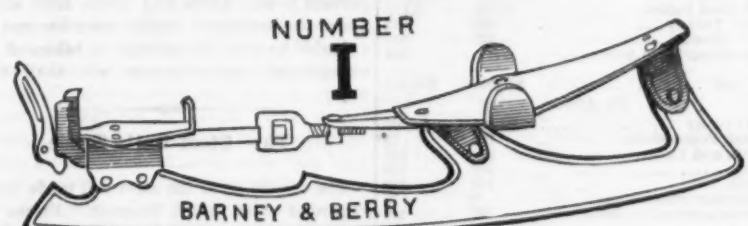
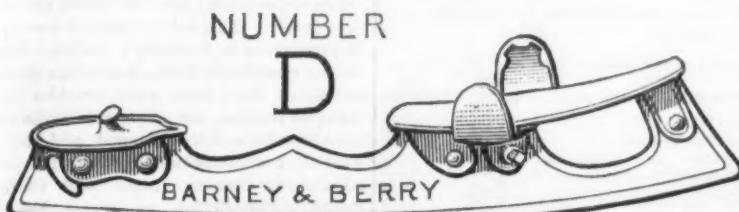
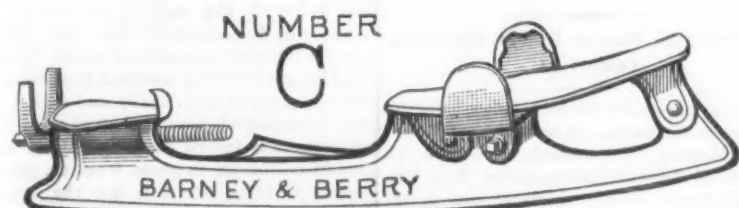
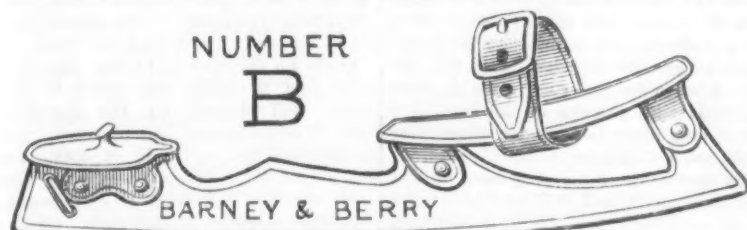
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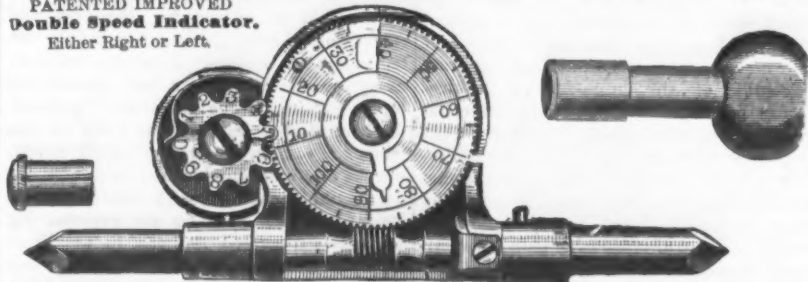
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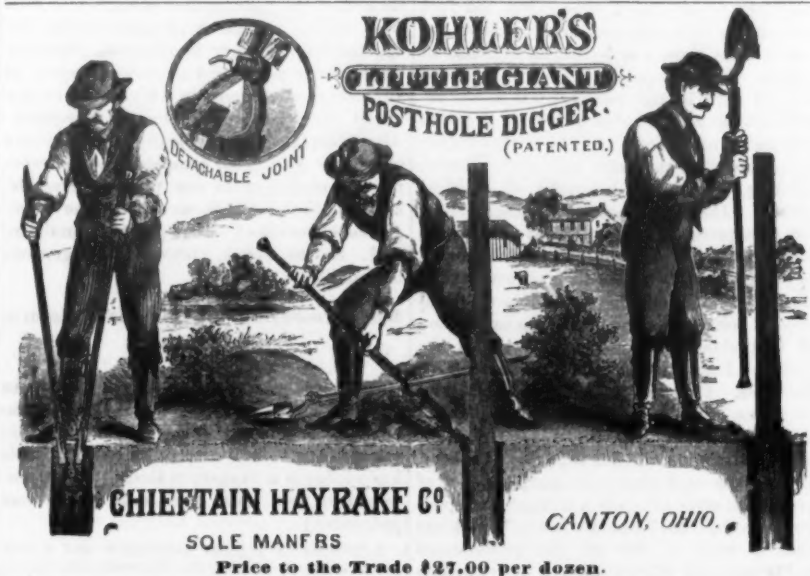
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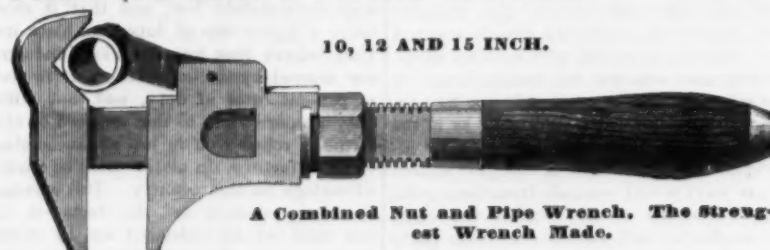
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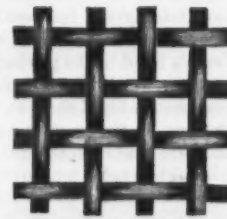
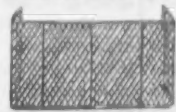
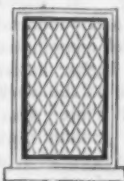
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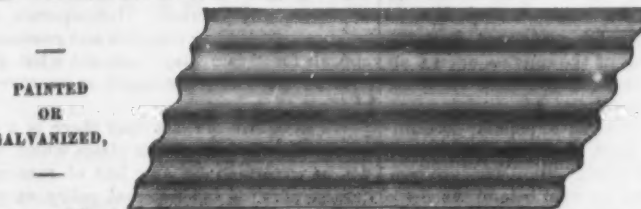
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The Water Supply of Venice.

Those who have stayed in Venice have learned what it means to be dependent for water upon an army of men, who, with barges, fetch a daily, or rather nightly, supply of liquid, rarely fit to drink, across the lagoons, from a stream emptying near a place called Servola. These old travelers, and those who have yet to visit that much-visited city, will be glad to learn that the inauguration of the Venice water works, by which a real piped water supply is carried into the romantic city, took place on the 23d of June last, and fully realized the expectations of all concerned in this piece of hydraulic engineering, which is internationally interesting. The contract for the works has been carried out by the Public Works Company of Italy—Messrs. Breda & Co.—including the construction of the reservoir and filter beds, at Moranzo, on the main land, and the laying of the pipes under the Laguna to the city of Venice of a total length of somewhat over 4 miles, of a diameter of 31.5 inches, and the laying of the total length of mains in the thoroughfares and canals of about 16 miles, of a diameter of 11.8 inches. In the course of laying these mains they were taken at 85 places across canals, and twice across the Grand Canal, work which involved considerable difficulties. The work also included the construction of an engine-house and reservoir at St. Andrea, the erection of a pair of 50 nominal horse-power engines, together with laying on the water to all the principal buildings and hotels in the city. The work was commenced early in January, 1881, and was consigned, to the entire satisfaction of the concessionaires, on the 23d of June, 1884. The concession was originally granted to Mr. D. C. Dalgairns, C. E., of Palermo and Penge, in 1876, upon provisional plans and studies then deposited, and the works have been carried out on the definite plans presented by him on the 23d of June, 1877. The company to which the property now belongs is the Société des Eaux pour les Etrangers, of Paris, which was formed for the purpose of carrying out this scheme in January, 1879.

Protecting River Banks from Caving.

At Memphis, Tenn., on the Mississippi River, a caving bank rises straight up from the water's edge from 10 to 50 feet at its base. There is an incessant lapping and chafing by which it is slowly worn away and undermined, and, as a consequence, it breaks down piece by piece and is dissolved and carried away by the river. To check this steady but slow disintegration is the problem which United States engineers are trying to solve satisfactorily. The idea of a blanket placed along the slope of the bank from high-water mark to the bed of the river naturally suggested itself, and the present device, a willow and pole mattress, represents the blanket theory. The woven webs are some 50 feet wide and from 200 to 1000 feet in length, with flexible willows worked in for woe, and poles and wire for warp. These are made on boats having a length equal to the width of the mattress, and as the mattresses are completed they slide away into the water. The sunken mattresses, it is said, prevent undermining below the low-water line, and the grading down of the overhanging bank stops the undermining above that line. The space between the upper edge of the mattresses and the top of the bank is protected with willows and stone. All this mattress-grading and stone-covering is embraced in the term revetment.

The work already done by the engineers and the harbor force under them seems to be of the most substantial character. The appropriation of \$200,000 secured from the last Congress for this work will, it is estimated, be sufficient to place mattresses along the river front from Wolf River to the foot of Beal or Linden streets. This work will probably be completed before the rise of the river takes place this season. Whether this work will hold the bank and prevent it from further caving is yet to be tested, says a Western contemporary. Next spring, when the floods turn the Mississippi into an inland sea, the practical test will be made, and, if the mattresses hold the banks successfully against the impinging and undermining current, the mattress-revetment theory will be sustained. If not, our authority naively adds, then some other plan will suggest itself to and be adopted by the Mississippi River Commission, who have control over this work.

Southern Coal Exports.—A new channel for foreign trade appears to be on the eve of developing in the South. A trial shipment of coal has been made on account of the Pacific Mail Steamship Company from the Alabama mines of the Mobile and Ohio Railroad, for the use of the steamers of the former company at Aspinwall. The United States has been a large exporter of coal ever since coal mining became one of its chief industries, the quantity sent out of the country during the fiscal year ending June 30, 1884, aggregating 649,040 tons anthracite and 646,265 tons bituminous, but this came almost wholly from the coal belt extending through Pennsylvania, Virginia and Ohio, and was sent chiefly to Canada and the West Indies. The novelty of the above-described transaction consists, however, in the fact that it is the first shipment made from a Southern port of the product of Southern coal fields. The coal deposits of Alabama are as extensive as they are valuable, and the ability of the owners of these mines to place their product at a price that will attract export buyers opens to them the possibilities of a large foreign trade which may prove of great importance to the port of Mobile, as well as to the industrial resources of Alabama.

The attempt of the Canadians to attract immigration to the country west and northwest of Lake Superior does not seem to be very successful. In the nine months ending September 30 only 9700 immigrants located there, which is 34 per cent. less than the movement thither in the corresponding period of 1883. The total number of immigrants settling in Canada has fallen off 18 per cent. as compared with last year. The returns further show that, out of 127,000 immigrants arriving in Canada, 42 per cent. crossed over to settle in the United States.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, November 6, 1884.

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Presidential Elections.

At last the great quadrennial struggle is
ended, and the question is settled who is to
preside over the destinies of the Republic
until March 4, 1889. The partisans of the
victorious candidates are not unnaturally
highly elated over their success, after a cam-
paign unprecedented in excitement, bitter-
ness and even ferocity. The battle was
waged with earnestness up to the very last
minute possible, the issue, unlike previous
Presidential campaigns, having been in doubt
until the votes were actually counted. Sanguine
partisans on both sides were for weeks im-
pressed with the fact that victory would
perch upon their banners, but those who
looked on with cool heads were baffled by the
varying elements entering into the campaign
and the uncertain allowance to be made for
the number of votes cast for minor candi-
dates. Those who have seen their cherished
leaders defeated and their opponents ride
proudly on to victory must, of course, feel
somewhat dejected, but they have the con-
sciousness of having worked zealously for the
candidates of their choice, and having given
their opponents a vast amount of trouble.
As good American citizens, however, they
will composedly and resignedly submit to the
will of the majority, and wait patiently for
the passage of time, in the hope that four
years hence their party will be successful
and that it will be their lot to join in shouts
of victory and expressions of triumph.

While the heat of the conflict is still felt
and the smoke of the battle has hardly blown
away, it seems to be an appropriate time for
some non-partisan reflections concerning these
Presidential elections. Early this
year, before the nominating conventions were
held, the impression prevailed that the Presi-
dential election would not exert much influ-
ence on business. If business was active, the
political contest would not seriously inter-
fere with it; and if it was dull, the

depression would not be measurably intensi-
fied. Of course there were not wanting
those who predicted a very dull year for
business solely on account of the election,
but it was difficult to attach much credit to
their predictions in the light of past experi-
ence. Now, however, we can clearly see the
baleful effect it has exerted on almost every
branch of trade. As the 4th of November
approached, the depression in business grew
more and more pronounced, until within the
past month there was a general disinclina-
tion to do more than was absolutely neces-
sary. This election may, of course, be
looked upon as exceptional in the degree of
interest taken in it. At the beginning of
the campaign few persons had any adequate
conception of the intensity of political
feeling that would develop, or the universality
of interest that would be taken in the
contest by the voters of the country. Per-
haps at no time in our history, except during
the civil war, have the people so generally
taken part in political demonstrations or
engaged in the discussion of political ques-
tions. It may be claimed that the Presi-
dential contest of 1884 has been a very peculiar
and very exceptional one, for reasons not
necessary to be stated here. But the fact
remains that our national elections have for
a long time shown a continued increase in
fervor. The campaign of 1880 surpassed
that of 1876 in this respect, just as the re-
cent contest eclipsed that of 1880. It seems
reasonable to suppose, therefore, that future
occurrences of this sort will show corres-
ponding growth in intensity of political
feeling. The supporters of the candidates of
the two prominent parties have regarded
their opponents with almost as much enmity
as though they belonged to separate nation-
alities. Under such circumstances a subse-
quence of political feeling to a mere expression
of individual preference is not to be ex-
pected. Nor, indeed, does it seem to us
desirable. Political activity among the peo-
ple is one of the means of keeping patriotism
alive and prompting the masses to that
eternal vigilance which is the price of liberty.

It is often said that the sharp conflict of
parties is, after all, only a struggle for spoils
between the "ins" and the "outs." No doubt
this is true, so far as the professional
politicians and office-holders or office-seekers
are concerned, but there are upward of
50,000,000 people in the United States who
are not professional politicians, who do
not hold office and never expect to, who
have no favors to ask of parties or candi-
dates, and who have no direct personal in-
terest at stake in any election. The conflict
of the politicians would be unimportant and
without significance if the great mass of
the people, not alone the voters, did not take
sides and go vigorously to work for one
party or the other. There is no chance in
times like these for a citizen to be wholly
indifferent. He cannot help taking sides,
and by reading and discussion he learns a
great deal and is drawn into closer relations
with the political system of which he is an
integral part, however he may neglect the
duties and privileges of his citizenship. We
may be sure that once in four years we shall
have a great public accounting. The secrets
of the party in power will be laid open, and
the pending issues fully and eagerly dis-
cussed. Candidates must step before the
public like the nude Phryns before the
tribunal of the Heliasts, and, if they are un-
able to bear a close scrutiny of their per-
sonal characters and political records, they
must take the consequences. The histories
and purposes of parties are closely scanned
and critically analyzed, and millions of in-
telligent men who are not seeking honor or
reward, and whose votes could not be pur-
chased, talk and work and vote as if the
destinies of the nation hinged on their in-
dividual efforts to save it. A foreigner unused
to our ways would conclude from the popular
tumult that the country was on the verge
of revolution, and that the winning party
would have to carry its candidate into office
by force of arms. But two or three days
after election he would witness a phenom-
enon even more surprising—the noisy,
excited multitude dispersed, every man
turning contented and happy to his own
business, loyal to the decision of the major-
ity, and prepared to laugh over the bitter-
ness and passion of the campaign. But, as
the net result of all this, we have a great
awakening of popular interest in the man-
agement of the Government, a great popular
education in contemporaneous history, and
an intelligent interest in looking more
closely after the work which lies at every
man's hand in the primaries, where the foun-
dations are laid upon which the great politi-
cal parties build their rock castles—or card
houses, as the case may be. We are not at
all sure that such an exciting canvass as that
through which we have just passed is not
attended with a great national benefit. An
occasional readjustment of party lines is a
good thing. Men who conscientiously leave
one party and go to another show that they
rate the claims of citizenship above those of
party affiliation. A close race between parties
makes that which wins more careful to avoid
defeat in future, and that which loses more
hopeful of gaining public confidence. Even the
bitter personalities of the canvass are not an
unmixed evil. They will tend to place a check
upon the ambition of men whose characters
cannot safely be held up to popular scrutiny
under the fierce light which the newspaper
press casts upon them. Men who are con-
cealing dishonesty or vice behind the cloak
of an external propriety in all social and
business relations, will dread the fierce ordeal

and hesitate to put themselves forward as
candidates. When a great campaign turns
upon moral issues it indicates a great awak-
ening of the moral sense of the community.
By these means are set in motion forces
which in the past have worked together for
good to the Republic, and we may expect
they will continue to do so.

There is a feeling among business men
that Presidential elections come too often.
Perhaps their frequency is less injurious
than the duration of the canvass. We could
as well decide between the candidates before
in six weeks as in six months, and less
time would be offered for dishonest and
corrupting political manipulation and the dis-
bursement of moneys. It is also urged by
many that November is a bad time of year
for an election. The propriety of postpon-
ing it until after harvest was more obvious
when our country was young than it is now,
but we really do not see how even now the
date could be changed with advantage. In
November each year we are experiencing
the between-season's dullness in nearly all
lines of wholesale trade. The crops are
gathered and the fall merchandise distribu-
tion is pretty much over. We are nearing
the end of the year, almost always with sails
close reefed to better prepare us for the
approaching January liquidation. Business
would suffer more or less serious injury at
any season of the year in which the election
might occur, but probably least in November.
Altogether, the philosophically-minded citizen
may view with great complacency the quad-
rennial ebullition in our political crucible,
knowing that by such means are the incon-
gruous elements of our population emulsion-
ized, so to speak, into a homogeneous
nationality.

Misrepresenting the Tin-Plate Reform Movement.

In a circular just issued by the American
Tinned Plate Association, entitled "Im-
portant Statement," we find the following,
which shows how true it is that "a little
knowledge is a dangerous thing" when pos-
sessed by men with more enthusiasm than
judgment:

Influenced by popular indignation and a well-
grounded apprehension that this association is cer-
tain to secure from Congress "fair play" to
American manufacturers, and relief to American
consumers from foreign tin-plate impositions, by
the enactment of protective duties on "tin plates"
and "taggers iron," these British manufacturers
and their American stool pigeons, the importers,
have advertised a so-called "reform," the prin-
cipal features of which, so far, have been a con-
fession of past sinful practices on the one hand,
while using the "reform" as a lever with which
to obtain larger profits from American consumers
on the other hand, by extra prices for special
brands and crosses. It is a "Heathen Chinese"
business wherein the "crosses" crown the inno-
cent philanthropic importer. The American people
can have no permanent relief nor security from
future impositions except through a development
of American manufacturing competition by pro-
tective duties.

The only conclusion the well-informed
reader can draw from this is that, if the
gentlemen who are responsible for the above
know no more about tin-plate manufacture
than they do about the reform movement in
the tin-plate trade, they would not be likely
to derive any important benefit from the
amount of protection they demand, if they
should secure it.

The propriety of the movement inaugu-
rated by the United States Tinned Plate
Association is not open to question. They
believe that the rate of duty on tin plates is
disproportionately low, and that it should
carry a higher rate of duty than black iron.
They believe that important local industries
are injured by the importation of tin plates
at present rates of duty, and that, with a
duty proportionate to that imposed on other
forms of rolled iron in less advanced stages
of manufacture, tin plates could be made to
advantage in this country. This argument
is strong enough on the facts—it does
not need to be bolstered up by misrep-
resentations. By attacking the reform
movement, which has at last attained the
point of practical protection for consumers,
they are likely to alienate the sympathies of
all who are affected thereby. To say that
the guarantee system is used as "a lever
with which to obtain larger profits from
"American consumers by extra prices for
"special brands and crosses," and that "it
is a "Heathen Chinese" business wherein the
"crosses" crown the importer," is to give
utterance to something very like a malicious
libel. It is an insult to the best men in the
trade—men of unimpeachable personal char-
acter and business standing. It shows
hostility to even a worthy and beneficial
movement unless it be one which contributes
directly to the success of the higher duties
movement. It also arrogates to the work
and purposes of the Tinned Plate Asso-
ciation an importance vastly greater than
they have ever possessed in the estimation of
the trade or the public. The reform move-
ment was the natural outgrowth of a
necessity incomparably greater than that
which exists for an increase in the duty on
tin plates, and the latter movement has not
been conducted thus far in a manner to cause
importers any anxiety. Intemperate ut-
terances, misleading statistics and passionate
appeals for "fair play" are not what give
such an undertaking strength or improve its
chances of success.

We recognize the fact that there is a dis-
crimination in favor of tin plates which can-
not be explained on any line of reasoning
consistent with the national policy of pro-
tection to American industry. They are ad-
mitted under a revenue duty which in the

tariff is sandwiched in between protective
duties. Logically, either the revenue duty
is too low or the protective duties are too
high. The discrepancy is one which should
be corrected, especially as it originally grew
out of a mistaken construction by Secretary
Fessenden of the tariff of 1861, involving
a confusion of ideas as to tin plates and
tin in plates. We are also prepared to ad-
mit that we should be glad to see a tin-plate
industry established in this country. The
competition of the domestic product would
be wholesome and would tend to raise the
quality standards. There are a great many
reasons why we are glad to see a movement
in this direction in this country, but we have
never considered wise or judicious the means
taken to popularize the idea. Still less are
we prepared to see the good work of years
swept aside with a wave of the hand and
superficially described as an advertising
swindle and a "Heathen Chinese" business.
This is unworthy of the projectors of any
honest movement, and will tend to bring it
into contempt with those who know the facts
and respect the truth.

Our Domestic Export to Non-European Countries.

We have prepared the table below from the
returns of the Bureau of Statistics, at Wash-
ington, showing in thousands of dollars the
export of domestic merchandise from the
United States during the fiscal year ended
June 30 last, and the corresponding period of
the previous twelvemonth, to countries out-
side of Europe:

To North and Central America and West Indies.	1883.	1884.
British North America.....	\$40,717	\$40,434
Cuba.....	14,568	10,568
Mexico.....	14,871	11,080
Porto Rico.....	8,848	8,558
Central America.....	2,116	2,159
Hayti.....	1,937	3,065
French West Indies.....	3,163	2,736
St. Domingo.....	1,783	1,791
Newfoundland.....	1,179	1,258
Dutch West Indies.....	2,115	2,067
Danish West Indies.....	580	520
British Honduras.....	696	579
Miquelon.....	488	415
Total.....	\$92,388	\$85,765

To South America.	1883.	1884.
Brazil.....	\$9,150	\$8,645
Colombia.....	6,740	5,175
Argentine Republic.....	3,353	4,326
Venezuela.....	2,368	2,389
British Guiana.....	1,973	1,833
Uruguay.....	1,396	1,340
Chile.....	2,835	3,227
Peru.....	457	1,044
Dutch Guiana.....	448	817
French Guiana.....	101	102
Other South American coun- tries.....	94	623
Total.....	\$38,997	\$30,431

To Asia and Oceania.	1883.	1884.
China.....	\$4,080	\$4,626
British East Indies.....	2,126	3,711
Japan.....	3,376	3,516
Australia.....	5,539	5,325
Sandwich Islands.....	3,688	3,446
Hong Kong.....	3,706	3,079
Dutch East Indies.....	2,407	2,110
Assiat Turkey.....	309	482
Russia.....	121	139
Other countries in Asia.....	129	229
Total.....	\$39,607	\$39,565

To Africa.	1883.	1884.
Cape Colony.....	\$2,406	\$1,530
Spanish Possessions.....	187	79
Algeria and Tunis.....	256	242
Egypt.....	201	358
Libya.....	180	126
Portuguese Possessions.....	5	79
Other countries in Africa.....	797	159
Total.....	\$3,134	\$2,525

Recapitulation.	1883.	1884.
To North and Central America and West Indies.....	\$92,388	\$85,765
To South America.....	38,997	30,431
Total America.....	\$131,385	\$116,196
" Asia and Oceania.....	39,607	39,565
" Africa.....	3,134	2,529
Grand total.....	\$174,086	\$148,290

The entire domestic export decreased 4
per cent, more than accounted for by the
decline in the value of the goods shipped.
The falling off in the export to Cuba is due
to the crisis through which the chief industry
of the island, that of sugar planting, has
been passing, and the low price of the staple,
which has not been so cheap since 1847.
Prospects under this head are gradually im-
proving, and with them our shipments may
resume their former importance. The de-
crease in our shipments to Mexico has been
nearly as great. A couple of years since
there was a tendency here and in Europe to
consign large amounts of goods to that
country, and the Mexican business was
overdone. Monetary and financial embar-
assments supervened, new direct taxes,
levied on the transactions of merchants and
dealers, had to be decreed, and trade has
been disturbed. The present reaction is
working its own cure, and after a while
merchants down there will be quite willing
to order fresh lines of goods. The increase
in our Central American shipments will be
noted. Guatemala in particular is in a
flourishing condition, with a fair chance that
the prosperity may last. Hayti took less
from us in consequence of the low price of
coffee and the late civil troubles. These
drawbacks are gradually being overcome.

In Brazil the coffee crop was not so large
as usual, nor did the price make up for the
deficiency, and all other produce was low.
The slavery agitation and rather disquieting
finances also stood in the way of trade, and
in this manner less was ordered from this
country. Colombia is also to some extent
politically unsettled, which may have inter-
fered with free ordering. Quite an increase
is, on the other hand, noticeable in ship-
ments to the Argentine Republic, partially
due to American enterprise entering largely
upon railroad building, and the shipment of
material in consequence. The country is
quiet and remarkably prosperous; hence our
business prospects there are promising. So

they are in Chili and Peru, whither we shipped
considerably more. If copper and wheat are
low in Chili, the growing prosperity of the
newly-acquired Province of Tarapaca in a
measure compensates for it in the shape of a
larger nitrate production. The permanent
exhibition of American goods at Santiago
will give still greater impulse to our grow-
ing relations. Peru seems to approach
pacification, and will take, after a while,
large lines of our goods, notably sugar ma-
chinery to replace what was destroyed.
"Other South American countries" in our
table comprise Ecuador and Bolivia, now
restored to a state of peace and rapidly
recovering prosperity. The increase in our
trade has been notable, and will continue so.

Quite an increase has taken place in our
shipments to India, and even to China.
Much will depend on the duration of the
Franco-Chinese complication, which
is injurious to the trade of both. Japan
has fallen off, because trade with Europe
and America had been largely overdone,
but that country is singularly elastic; a
great central railroad is being built through
the heart of the richest provinces, and
there will be plenty of tea and silk to
pay for increased amounts of goods. Nether-
land India orders less merchandise because of
the low price of both coffee and sugar; the
only agricultural pursuit that pays in Java
at present is indigo planting. Java takes
chiefly petroleum in cases from us, the low
price of which accounts for the lessened
amount of shipments.

The Cape Colony has not taken our goods
very freely. This colony has not been quite
so prosperous as formerly; its wool finds a
serious competitor in the Australian product,
and there have been some troubles in the
diamond regions, but shipments of diamonds
have now been fully resumed, and the new
wool clip may bring better prices. The proba-
bilities are that our trade will increase.
Egypt, under British occupation, has been
expanding in trade.

Prices are so low in the United States at
present that there is every inducement in
the countries named in our table to order
from here increased amounts, and, as our
domestic trade is on the whole the reverse of
active and prosperous just now, our mer-
chants and manufacturers will no doubt do
all in their power to foster these business
relations. The Federal Government has
taken important steps in the same direction
through reciprocity treaties and a special
commission to inquire into and prepare the
way for an enlargement of our trade. Since
the Centennial much has been done in this
respect. It is fair to presume that the
efforts now being made will be crowned with
still greater success, because of the expe-
rience we have gained and the generally
peaceful condition of the countries most im-
portant to us. Cuba and Porto Rico alone,
under the proposed treaty, may become in-
valuable to us if advantage is taken of the
exceptional opportunities we shall then
enjoy.

The Steel-Rail Trade.

The condition of the steel-rail trade is now
regarded with much interest. Prices are
certainly a great deal firmer than they have
been, and the possibility of higher prices in
the near future seems to be almost assured.
The minimum price named is now \$28 at
works, but there are very few sellers at
even that rate, \$29 to \$30 being the more
common quotation. This shows a very de-
cided change from the condition of affairs a
few weeks ago, when steel rails were weak
at \$27 at works. It has been asserted that,
during that period of fierce competition for
orders and very low prices, sales were made
which realized but \$25.50 net at some of the
mills. This is denied very positively by
those who have excellent opportunities for
ascertaining the facts, and we are inclined
to believe that \$26.50, or possibly \$26.25,
marked the extreme point touched in the
direction of low prices. The tendency now
is in the opposite direction, and it seems
very probable that an era of high prices is
in store for the steel-rail trade before the
low figures of the fall of 1884 will be
repeated.

In considering the present condition of
the steel-rail industry it must be borne in
mind that great changes have taken place
within the past year or two. There are no
longer 14 large Bessemer steel-rail plants
either in active operation or in readiness to
make rails with an improved demand. Six
of the large plants are either idle, without a
hope of resumption until prices are very
much higher than those now prevailing, or
else they are being used for the manufacture
of steel for miscellaneous purposes. This
very greatly reduces the capacity of the
works in the United States that are prepared
to make steel rails at anything like present
prices. A further reduction in capacity will
also be accounted for in the disposition of most
of these eight concerns to engage in rolling
other forms of steel than rails, and which are
more profitable. At least one of these eight
establishments is indifferent about rail or-
ders at present, finding other lines so much
more remunerative. The product of the last
six months of 1884 has been so curtailed by
various circumstances that it is now believed
it will amount to little over 300,000
gross tons of rails for the entire country. If
the product of the first six months of 1885
is no larger, it will very probably be below
the requirements of the country, judging
from the experience of previous years. If
this is the case, taking into consideration the

diversion of Bessemer steel into other forms than rails, and the idleness of a number of plants which will not be put into shape for resuming operations so long as prices are below their limit of cost, the outlook for those companies depending principally upon rails and able to turn them out at current prices seems much brighter. At no time in the past 13 years has the annual consumption of rails in this country been below 764,000 net tons, the average for the 13 years having been 1,280,895 tons. The mileage of new railroads built next year may and doubtless will fall considerably below that built this year, but the minimum built in any one of the past 13 years was 1713 miles, and the average for that time was 5280 miles. It is therefore probable that next year will see considerable business coming in for new construction, notwithstanding the depressed condition of general trade. The following table exhibits the annual increase of railroad mileage in this country, the total rail consumption and the total rail imports in the years 1871 to 1883, inclusive:

Years.	Miles of railroad built.	Total rail consumption, net tons.	Total rail imports, net tons.
1871.....	7,379	1,341,935	566,302
1872.....	5,578	1,534,550	580,550
1873.....	4,107	1,148,849	256,712
1874.....	2,105	857,734	106,311
1875.....	1,713	811,960	19,448
1876.....	2,712	879,916	287
1877.....	2,281	764,744	35
1878.....	2,087	682,085	10
1879.....	4,721	1,167,439	44,147
1880.....	7,174	1,752,539	290,089
1881.....	9,789	2,280,421	36,321
1882.....	11,591	1,912,921	224,127
1883.....	6,500	1,369,671	25,977

While the years 1871 and 1872 with 1881 and 1882 did very much to increase the yearly average in railroad construction and rail consumption, it will be observed that for five years of the term under consideration the rail consumption ranged between 800,000 and 900,000 net tons. That was at a time when there were fewer railroads in the country than now, the additional mileage constructed since then having been almost 50,000 miles. Notwithstanding the increased endurance of steel rails compared with iron rails, for which some allowance must be made, it seems reasonable to suppose that an addition of about 66 per cent. to the railroad mileage of the country would expand the rail requirements to something beyond the limits of 1874-78. Importations have been completely checked, and are now impossible with prices and duties as they are, so that there is no provision to be made for any deduction from the consumption in favor of foreign manufacturers. The demand for steel rails for next year may not amount to more than 800,000 net tons, but if it reaches that figure it will very likely furnish the Bessemer works of the country with all the business they care to handle in the shape of rails.

A specimen of the unscrupulous attempts now being made to "boycott" steel rails has recently come to our notice. A prominent Pittsburgh daily says that the La Belle Iron Works, of Wheeling, who have just fitted up their works at much expense for the manufacture of steel rails, are making preparations for resuming the manufacture of iron rails. The same authority says further that the workmen employed at these works express their belief that the La Belle Iron Works are convinced that steel rails are going to be a failure. They allege that much more scientific knowledge of tempering steel must be obtained ere a steel nail can be made to successfully compete against an iron one. When the steel nail is made soft enough to clinch, invariably it is too soft to drive. The article from which we obtain this information winds up with the following "clinger": "It is worthy of note that the manufacturers who had a 'strong belief in the utility of steel rails' are now changing their opinion, and the 'quiet action of the La Belle Nail Company' accelerates their change of opinion." The information upon which this remarkable statement is founded must have come from parties who are interested in preventing the development of the steel-nail trade. The president of the La Belle Iron Works advises us that there is no truth in the alleged facts given. They have been in operation about a week on steel nails, and while their product continues as satisfactory as it has been since they started they will never make any more iron nails, unless their cost is materially reduced by the Amalgamated Association. The president says, further: "The new goods are a success to us and eminently satisfactory to the 'trade,' as we have many testimonials to show." It is unfortunate that reputable journals should permit themselves to be used as vehicles for the dissemination of such unadulterated misinformation.

The communication on "Standard Sizes for Hexagon Bolt Heads and Nuts," published in another column, directs renewed attention to a matter which for a long time past has been the source of a good deal of annoyance. Standards have always proved subjects fruitful of discussion, and it has well been said that, while we have heard a great deal about them, we have still more to learn. We have found it to be a difficult undertaking to successfully carry out some very simple schemes in this line, particularly so as regards standard screw threads and the standards referred to by our correspondent, and we most cheerfully commend to the attention of those interested the suggestion to abandon the term "standard" work, or at least to think less of it than of "good" work. We have always been glad to give

space to communications bearing on this subject, and while some very valuable and interesting information has thus been brought out, and various suggestions have been made to afford relief from the inconvenience attending present methods, much still remains to be said. The matter throughout presents a most strikingly peculiar condition of things, and there is no reason whatever why the independent action of different manufacturers and the results which they call "standard" should not be so modified as to bring about a much more satisfactory state.

Advices from England state that the Cleveland pig-iron combination to keep up prices has given way. It has lasted for a longer time than was originally expected. However, it is understood that the relinquishment of the combination to keep up prices will not interfere with the agreement to restrict production, which does not terminate till next February, and is strictly binding. Referring to this matter, Ryland's *Iron Trade Circular* for October 18 says: "It has been 'beneficial as long as it has held, and so far so good. There must come an end to all 'things of this kind, and with forge pig' down from 1/ per ton (the usual difference) to from 3/ to 3/6 below No. 3, it is a wonder how the price of No. 3 has kept 'up so well.' This action has had such a depressing effect upon makers that they contemplate a further restriction of production in order to check the downward movement of prices."

Almost simultaneously with the announcement that Alabama has begun to export coal to Central America comes the important news from Rio Janeiro that the Brazilian Government has removed the duties on coal. This action may result in increasing the consumption of mineral fuel in that extensive Empire. At present the quantity of coal imported is not very large, amounting to but 64,332 tons in the first eight months of the present year. As compared with the corresponding period of the previous year, however, there was an increase of over 18,000 tons. At all events, this trade is worth competing for, and our Southern coal miners should not let John Bull monopolize it.

The Present Condition of the Swedish Iron Industry and Its Connection with American Trade.*

(Concluded.)

The cost of making 1 gross ton of Swedish gray pig iron is, of course, somewhat variable, but I give the following figures as presented to me from an iron works which ought to show a fair average:

Ore, 2 tons at \$5 per gross ton.....	\$10.00
Charcoal, 180 bushels at 5 cents.....	9.00
Roasting.....	6.50
Limestone, 8 per cent.....	0.70
Labor.....	0.27
Interest and repairs.....	0.75
Total.....	\$18.67

Swedish wrought iron was produced in 1882 to the amount of 257,731 gross tons, including soft open-hearth steel and the small amount of puddled iron. The number of forges was 266. The bulk of this product is made by the three methods mentioned below. I would say previously that the Catalan forges were long ago abandoned in Sweden. By the Walloon process the first-class Dannemora steel irons are produced. On account of the great consumption of charcoal, amounting to about 158 bushels per ton, it is entirely limited to the Dannemora district. The white pig iron for this purpose is cast in pieces about 18 feet long and subsequently moved into the forge fire, one loop after the other being made from the same piece. The loops are hammered into blooms, which generally are heated by charcoal in fires similar to those used for the melting, in order to be stretched under the hammer into bars. A product made in this way entirely from white pig metal, although perfectly free from deleterious substances, contains, of course, carburized iron unevenly distributed. The product is therefore suitable for melting in crucibles, but would hardly be useful for rolling into shapes. By the reheating, some of the steel particles which melt at a lower heat than the soft iron run down on the bottom of the hearth and are utilized for the next charge. When these blooms are welded in separate heating furnaces by gas, a difficulty is experienced, as some of these steel parts cannot be accumulated.

In the Franche Comté process a weighed quantity of ordinary-sized pig iron is melted in a forge fire and worked into a loop. The blooms hammered from this are heated by holding them in the same charcoal which serves for melting the following charge of pig iron. As, however, the consumption of charcoal in this way is greater than where the blooms are heated in a separate gas furnace, and the product at the same time is hardly any better, the number of Franche Comté forges is limited.

Most of the renowned Swedish wrought iron is produced by the Lancashire process, substantially as follows: A quantity of about 200 pounds ordinary size mottled pig iron is melted with charcoal in a forge fire and worked into a loop which is hammered into blooms that are subsequently reheated in a welding furnace for hammering or rolling. If the silicon in the pig metal exceeds 1/2 per cent., the working would generally take too much time and the charge is therefore tapped off from the hearth after the first melting, when it is cooled off and then melted again. The charge ought not to be stirred up before all the pig iron is melted. The working is done thoroughly and in such a way as to leave no parts untouched. As the gray pig iron runs too quickly and the white alone precipitates the process, causing an uneven product, mottled pig iron is preferred, or, if this should not be at hand, a mixture of gray and white pig irons. When the boiling caused by the chemical action between the forge cinder and the carbon is

ended, the metal is broken up and held before the blast and thus gradually melted down into a loop. This loop is finally broken up, taken out from the hearth and brought to the hammer. If the work has been properly done, the loop ought to show a regular shape without any great projection. The homogeneity is plainly evidenced under the hammer. The hammer ought to be of sufficient weight, in order to squeeze out the cinder and make a perfect weld. What is neglected in this respect can hardly be made good by repeated weldings afterward. From well-known reasons a light hammer with a high stroke cannot produce the same effect as a heavy hammer with a smaller stroke. The loop is generally cut into three pieces, which are in the same heat hammered into blooms of the sizes required for further treatment. All defective parts are cut away and melted over again. As a good, thorough working can hardly be made on a larger quantity than 240 pounds, the weight of the bars generally does not exceed that amount. If, however, a larger weight occasionally should be required, two loops from separate fires can be taken out simultaneously and welded together.

A Swedish Lancashire hearth is made of cast-iron plates, with a circulation of water in the parts exposed to contact with the molten metal. The two copper tuyeres have a semicircular shape and are inclined. The blast has about the same pressure as in the blast furnace, and is somewhat preheated by passing through pipes laid in the back part of the hearth. The offgoing flame passes over the pig iron for the next charge. As the relative positions of all parts in the hearth exercise a great influence on the work, all of them are made adjustable and the firing is given by contract to the workman who is going to use the hearth and deliver the iron. This contract is made out so that all defective iron is deducted. The hammered blooms are taken to a welding furnace in order to be stretched under hammer, or to a rolling mill. When small sizes, as nail and wire rods, have to be rolled, the hammering for the welding furnace, in the best works, precedes the rolling so far as to make the smallest possible square, because it is, of course, impossible to squeeze out the cinder by rolling as completely as by hammering. The size of the hammered billets is, however, limited by the increasing length, which, of course, must keep within the width of the welding furnace. I have said that the heavy bars occasionally required may be made by welding two loops together, but they can, of course, also be made by the piling of bars, although the latter method is invariably at the expense of the quality, as the Lancashire iron does not weld as easily as puddled iron.

The Swedish welding furnaces depend to a great extent on English mineral coals. The domestic supply of this material is not sufficient, and the coal deposits are, besides, located at such a distance from the iron works as to make this fuel more expensive than the English coals. Instead of the imported coals, charcoal, wood refuse, peat and sawdust are sometimes used, although the use of these fuels are necessarily limited. In the ordinary Swedish welding furnace the gas producer and the furnace are closely connected, and a heating apparatus is placed in the chimney for the blast. The blast air is forced through an inclined tuyere through the back wall of the producer, and the combustion air from the same main pipe enters vertically through a slit about 1/2 inch wide, running across the furnace arch near the producer. A fan giving a pressure of about 1/2 pound per square inch supplies the blast. The fuel is charged through a hopper on the top of the producer, which is provided with a sliding cover, or, still better, with a bell. The producer has no grate, and the ashes are generally cleaned out once a week through the back door. The inside width of such a furnace is about 4 feet, and the length about 13 feet, thus giving sufficient space for pre-heating the blooms. By proper management the consumption of English lump coals for one welding ought not to exceed 20 cubic feet per ton, while it frequently runs as low as 10 cubic feet. The furnace bottom is lined with coarse quartz, or, still better, with sandstone when accessible. As the gas from the producer enters direct into the furnace, some of the ash substances follow the flame, and the fuel ought therefore to be as free as possible from pyrites. In order to obviate this they are often constructed with an additional chamber in the producer filled with charcoal, through which the flame is filtered. As it is required that a gas for welding should not contain more than 2 per cent. of moisture, and the amount of water is about 20 per cent. in air-dried wood or peat, and about 50 per cent. in sawdust, it is necessary either to drive out this water by previous heating or to condense the vapors. The former process is only in some few cases found to be economical. With regard to condensation, the well-known and ingenious arrangement of Mr. Lundin has been lately much modified by using surface condensers, thereby diminishing the volume of the offgoing deleterious liquid products. By condensation the great advantage is also gained, that ash particles are eliminated from the gas, thus protecting the iron and the bricks.

The Swedish rolling mills for assorted bar iron have generally three pairs of 16-inch rolls. The first pair, about 5 feet long, which contains diamond grooves from 6-inch to 2-inch, is seldom changed. The second pair, about 3 1/2 feet long, contains the grooves for different sizes and is changed accordingly. The third pair, about 2 1/2 feet long, is plain and polished in order to give a smooth surface to the flat bars. In this pair standing grooves are also frequently made for flats too thick for rolling in the ordinary way. The upper rolls for the flat sizes are chilled, while the lower ones are soft. All the rolls for small rounds and squares, as well as the polishing rolls, are, of course, chilled. As the flats thicker than 3/4 inch cannot conveniently be rolled by 16-inch rolls in the ordinary way, they are generally made in standing grooves, or, if it is not necessary to be too particular, by simply drawing down squares in the polishing rolls. In order to diminish the great number of rolls for different flats, universal mills have been recently adopted at many works, having one horizontal and one vertical pair. As the pressure in this way cannot be made

to bear simultaneously on all sides of the bar, this rolling goes slower than when adjustable collars are used. A Swedish rolling mill for merchant bars makes generally 80 revolutions per minute, and when kept fully supplied turns out about 200 tons per week of ordinary sizes—that is, of squares 3/4 to 2 inches and of flats 1 1/2 to 5 inches wide. The motors are almost exclusively water-wheels and turbines. The suction turbines with horizontal axes are especially adapted for this work on account of having the axle and gearing located in any convenient place between the water levels.

The Swedish rod mills have rolls of about 9 inches diameter, three-high, and running at about 400 revolutions per minute. The first rolls are about 2 1/2 feet long and contain only diamond grooves. The second rolls, about 1 1/2 feet long, have ovals and diamonds. The last pairs have only two rolls alternately up and down, containing about two ovals or diamonds each, this arrangement being made in order to facilitate the handling of the rod. As a rule, no lighter wire rods than No. 5 B. W. G. are produced, while No. 4 is the ordinary size. The amount of power required to drive such a mill is about 300 horsepower. The power required stands in proportion to the length of the rods, and therefore the coil weight, is entirely a matter of driving power, and hence lack of water is able to check the production of heavy coils.

The expensive labor at the ordinary rod mills, the large space required for receiving the coils, extending over the rolling-mill floor on account of the difference in stretching, and the difficulty in making heavy coils uniformly, have caused recently the introduction in Sweden of the continuous rod mills. These are built with about 10 horizontal pairs about 10 inches in diameter, placed close to each other, the increasing speed being regulated by cog-wheels. The introduction of cylindrical gears on the extension of the rolls has much simplified the construction, compared with the previously-used conical wheels on a main shaft. The rods, commencing from about 1 1/4 inches square, are stretched between the rolls, passing through screw-shaped guides. As the twisting, however, would produce a too great resistance at the high speed in the three or four last pairs, these are separated and arranged in line, the rods being caught in the ordinary way. There is, however, one way of taking up the stretch and making the roll self-feeding, which I am not yet at liberty to communicate. The way of placing the grooves diagonally in the continuous mills, thus avoiding the trouble from twisting in the screw guides, has not, as far as I know, come into use in Sweden. As an example of what can be produced in a continuous wire mill, it may be mentioned that Messrs. Washburn & Moen, Worcester, Mass., showed at the Electrical Exhibition, in Philadelphia, a continuous coil of No. 6 weighing 525 pounds.

I have mentioned the close connection between imported iron and steel, and can therefore hardly omit adding some words about Swedish steel-making. In 1882 there were produced 46,421 gross tons of Bessemer steel by 15 works, or about 30 converters, making a yearly production per converter of 1547 tons. This amount seems ridiculously small compared with the average production of about 40,000 gross tons by American converters for the same year. But it must be remembered not only that Swedish Bessemer works are constructed and managed in another way, but that the product is something entirely different. As the direct process in taking the molten pig metal from the blast furnace is used exclusively, the production is, of course, limited to that of the blast furnace. When only one blast furnace furnishes the material, not more than four charges in 24 hours are made. The converters are generally constructed with a capacity of from 2 to 3 1/2 tons, having an inside diameter of about 4 1/2 feet. The number of tuyeres is 7 to 13, having each 7 to 13 holes of about 3/4-inch diameter. The pressure of the blast averages 15 pounds per square inch. The bottoms are built of whole bricks, each containing one tuyere, and the spaces between them are filled with exact-fitting blocks. The mouth of the converter is inclined and contracted to about 9 inches. It is a mistake to suppose that Swedish converters are stationary, as the first experiments in that line have long since given way to the ordinary movable converters hung in trunnions. The manipulation of the converter, ladle, ingots and molds is generally done by gearing with belts and cog-wheels, as the hydraulic power is considered unsuitable on account of the climate, although the danger in that respect may possibly be somewhat exaggerated. The pig metal contains generally not more than 1 per cent. silicon, sometimes even less when manganese is present in sufficient amount. The majority of the Swedish Bessemer works are able to make a metal above 0.30 per cent. carbon probably unequaled by any foreign Bessemer metal. The spiegel for the hard and the ferromanganese for the soft metals are mostly imported. The spiegel is melted with pure coke in a cupola of about 2 feet inside diameter. As so much time generally elapses between the charges, the converter has to be fired up either by pure coke and charcoal or by gas from a special producer fixed with charcoal braze or wood refuse. The molds are placed in a circle and the metal is poured direct without bottom casting. The shape of the molds is usually prismatic, and they are divided in halves at the corners or through the sides. It is, therefore, necessary to separate them soon after pouring, in order to allow of the free contraction of the ingots. The sizes of the ingots are, of course, proportional to the section of the bars to be rolled from them, it having been found poor economy to use entirely the expensive work at the rolling mill for producing sound metal, when this object can most properly be reached in the casting. Soaking-pits have not yet been introduced. In order to keep the converters steadily running even with a small-sized blast furnace, a plant has recently been employed having one converter so small as to give metal for only one ingot and taking the pig iron from the blast furnace by frequent small castings.

The Swedish open-hearth steel, unequalled in quality, which has been lately imported into this country, is produced from the purest pig iron in mixture with wrought scraps and

Lancashire blooms. The original character of this process as supplemental to large iron works consuming its waste is, of course, changed, and more so in Sweden than elsewhere, because no great amount of wrought scraps can be accumulated. It is therefore necessary to produce special wrought iron in forge fires by the above-named process, which, however expensive, gives a material which on account of its superior quality can be sold at a correspondingly high price. In order to lower the cost of production, a method of adding pure and rich iron ore has recently been successfully introduced. If the Siemens rotators, producing wrought iron for open-hearth furnaces, could be made to work with less waste of iron in the cinder, they could undoubtedly be advantageously used in Sweden. The open-hearth steel furnaces are only of 1 1/2 to 5 tons capacity, partly because of the limited supply of raw materials and partly because a small charge is considered to be more carefully managed than a large one. The fuel is English coal or wood, refuse and peat, with condensing apparatus, when these materials are available. It has been found that sawdust alone, though good for welding purposes, does not answer where the increased heat is needed for melting soft steel.

The review given above is intended to convey an idea of the Swedish iron products which nearest concern America. Outside of these there are many other things made by the Swedish ironmasters. An awakening interest has in recent years been attached to making finished articles. But there is hardly any thought of importing these into America, the duties being too high. And it is besides in the interest of Sweden that American manufacturers using their irons should not be damaged by competition. Looking over the many changes in Swedish iron-making during the last few years, we cannot help asking about the most profitable methods for the future. That a direct process converting iron ore into wrought iron will be made a practical success seems tolerably certain, judging from the never-ceasing and various experiments on this tempting subject. It will probably at least be done so as to produce cheap and suitable wrought material for open-hearth steel. The Bessemer process, by which, as noticed above, a product is made in Sweden equal to good crucible steel, will probably be a greater commercial success when the converters can be constantly supplied either by remelting pig iron or, as recently tried, by blowing very small charges. The Lancashire and Walloon processes for making wrought iron, it is safe to assume, will be used for a long time yet, judging from the general satisfaction given by the products and from the buyers' opposition to any changes. A vital question concerning the future of Swedish iron-making is, of course, the fuel. As nothing else but charcoal can ever be used for the blast furnaces and forge fires, it will necessitate a careful cutting of the woods and a profitable process of making charcoal. With regard to gas producing for welding and melting, Sweden has some fuel of her own and is trying hard to become independent of the English mineral coals. If the so-called water-gas process, by which the dead weight of nitrogen is reduced to about one-third of the amount in ordinary gas, will prove a success even with domestic fuel, it would probably be the most proper way for heating metals if the furnaces are changed accordingly.

The introduction of mild steel has brought forth many facts which are not yet fully explained. The idea that chemical composition alone determines the quality of an iron or steel product has by them become considerably modified. Since the first discoveries of the influence on iron and steel of the five elements—carbon, manganese, silicon, phosphorus and sulphur—they have been experimented upon, singly and in combination, and have given an extraordinary number of variations. But a considerable lack of harmony in the results, and many strange contradictions, seem to indicate that iron and steel making are at present to a certain extent advanced beyond chemical control, and that, therefore, we know comparatively less than before. Mechanical tests have greatly helped to exercise a control, and it would no doubt be well if manufacturers stated more generally the mechanical, rather than the chemical, properties required. But even these tests often fail to give uniform results, and we may therefore probably look for a future control by microscopical examinations of the fractures.

The small productions of the Swedish iron works have astonished American manufacturers, but the increasing demand seems to indicate that it is not always the large products which give the best profits. Several circumstances contribute in Sweden to cool down the feverish desire for a hasty gain on a large production, and therefore the attention is more directed toward keeping up the quality. The Swedish character is generally calm and calculating. No protective tariff keeps the iron industry in a hot-house. No enterprise is allowed to be overburdened with more capital than is actually wanted.

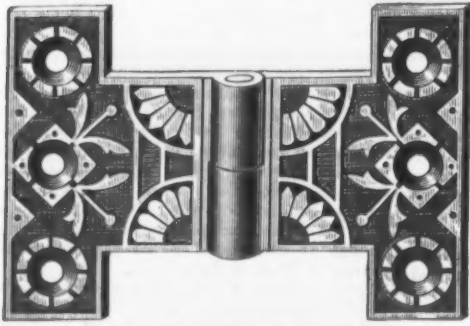
During the present period of depression the universal cry of American manufacturers is for cheap materials. In order to press down prices all kinds of devices have been got up, and the ingenuity displayed in this matter is to be admired more sometimes than the honesty. But there may be an excuse in the fact that hardly any temptation is so great as to give false statements about lower prices offered from other parties. But the prices of iron, which have been worked down in such a masterly way in order to have the largest possible margin of profit for the moment, can hardly remain for a very long time where they are, and it is not impossible that the near future will turn the leaf, and that a feverish race in the opposite direction will unduly raise them again. As the boom of 1873-80 was exaggerated by speculation, so the depression is now made deeper by artificial means, and in both cases the reaction will naturally take place. It would, however, hardly be possible to regulate this by warnings and advices, but, nevertheless, the unaturally great fluctuations which move American industry up and down more than any enterprises abroad will probably be more equalized in the future, and a more peaceful prosperity reigns in the greatest country on the earth.

* By N. Lilienberg, New York. Read at the St. Louis meeting of the American Association of Charcoal Ironworkers.

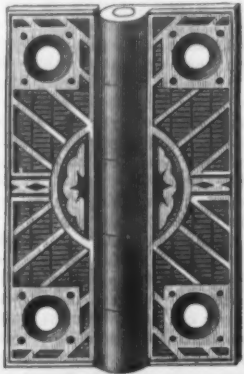
SARGENT & CO.,

HARDWARE MANUFACTURERS.

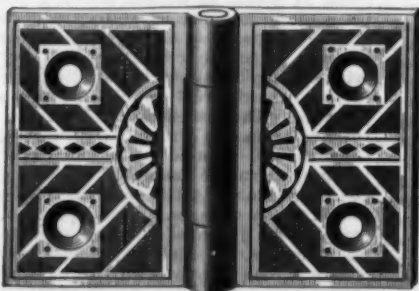
NEW YORK and NEW HAVEN, CONN.



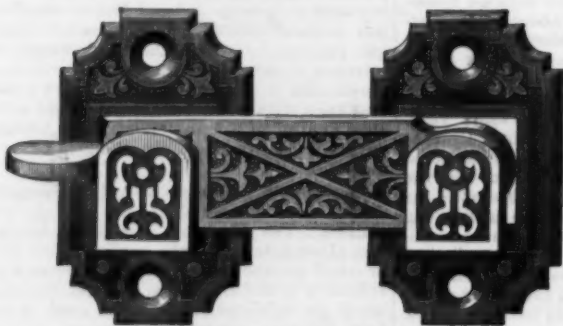
PARLIAMENT BUTTS.
Berlin Bronzed and Bronze Metal.



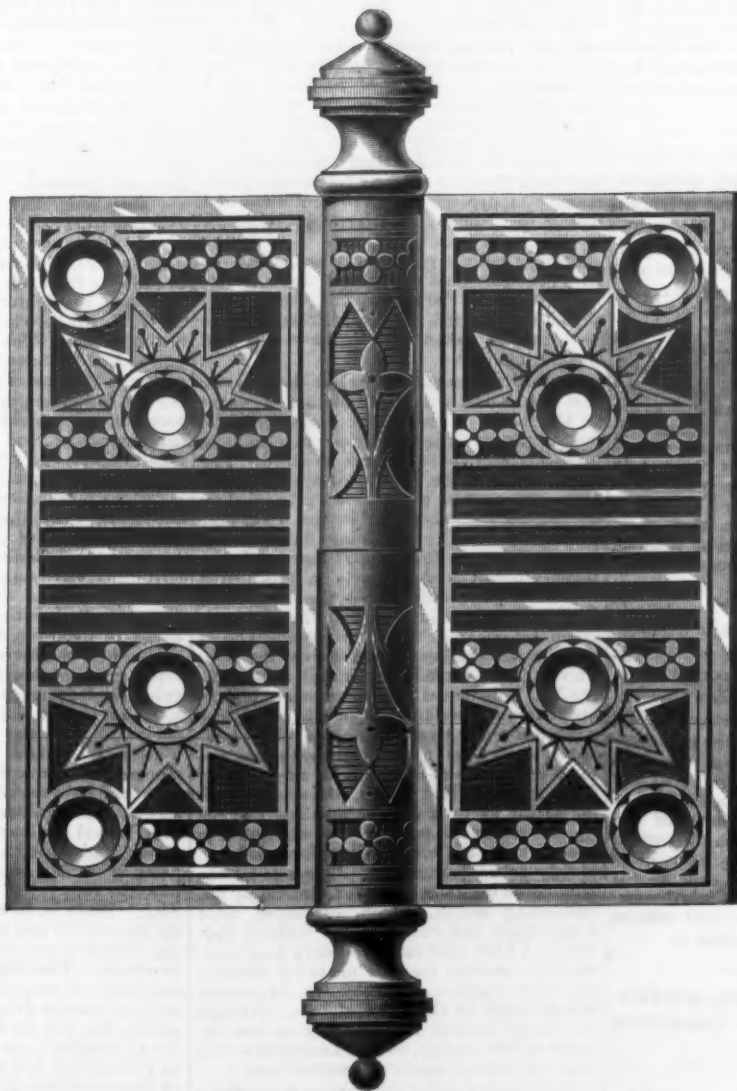
INSIDE SHUTTER HINGES.
Berlin Bronzed and Bronze Metal.



INSIDE SHUTTER HINGES.
Berlin Bronzed and Bronze Metal.



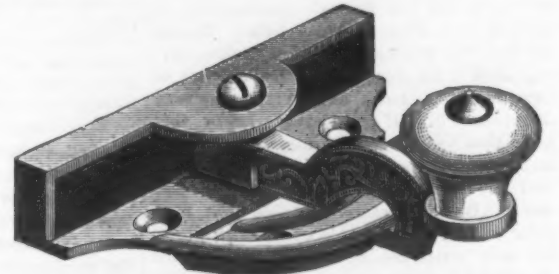
SHUTTER BARS.
Berlin Bronzed and Bronze Metal.



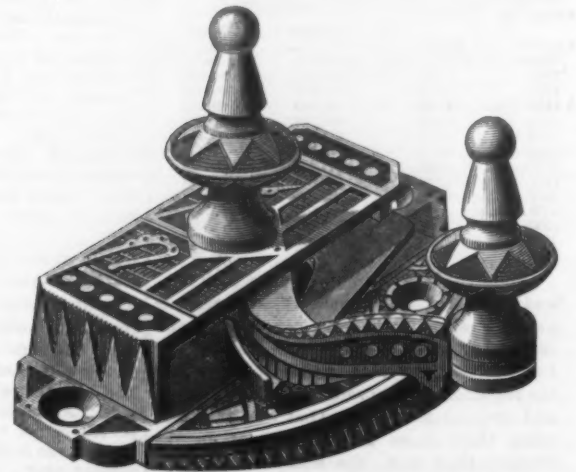
LOOSE JOINT BUTTS. No. 896, Bronze Metal.



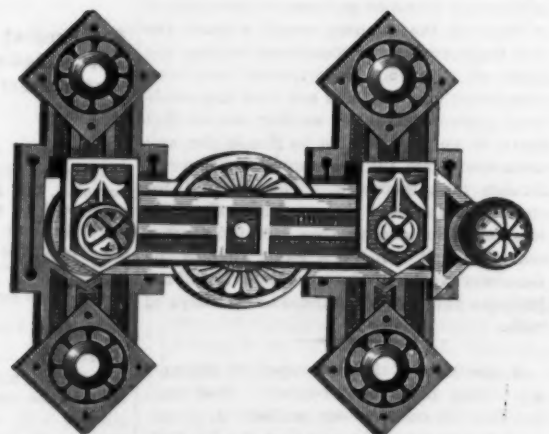
SHUTTER BARS.
No. 144, Bronze Metal.



SASH FASTENERS. Iron and Brass.



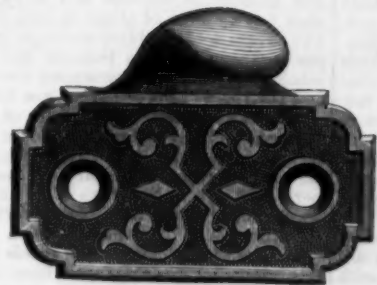
BURGLAR-PROOF SASH FASTENERS.
Berlin Bronzed and Bronze Metal.



SHUTTER BARS.
Berlin Bronzed and Bronze Metal.



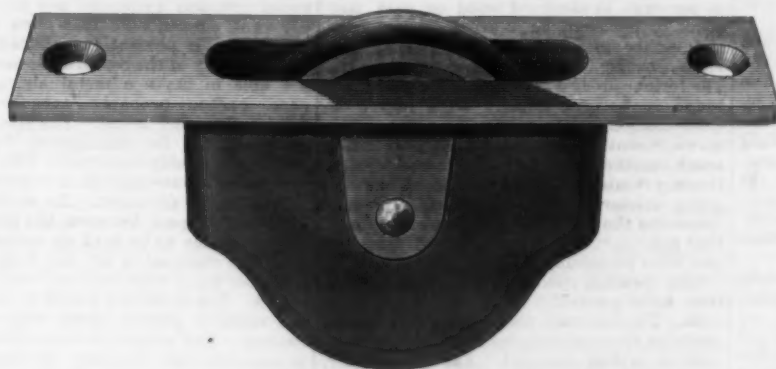
FLUSH SASH LIFTS.
Berlin Bronzed and Bronze Metal.



SASH LIFTS.
Berlin Bronzed and Bronze Metal.



SASH LIFTS.
No. 842, Bronze Metal.



WINDOW PULLEYS.
Plain Iron, Bronzed Face, and Brass Face.



SHUTTER KNOBS.
No. 64, Bronze Metal.

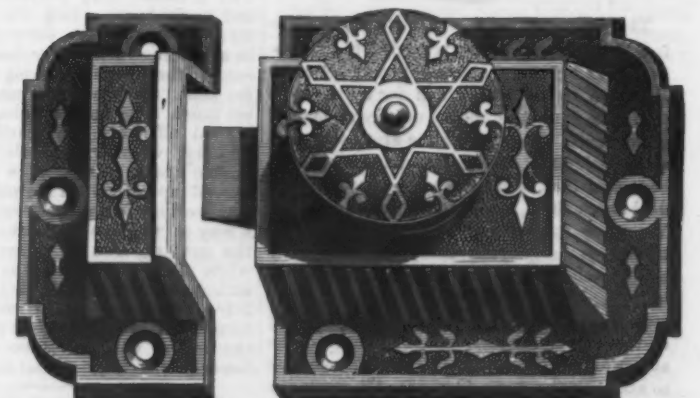
SHUTTER KNOBS.
Berlin Bronzed and
Bronze Metal.



DOOR PULLS. Bronze Metal.



LETTER BOX PLATES. Berlin Bronzed and Bronze Metal.



CUPBOARD TURN.
Berlin Bronzed and Bronze Metal.

Trade Report.

Philadelphia.

Office of The Iron Age, 220 South Fourth St.,
PHILADELPHIA, November 4, 1884.

Pig Iron.—The past week, as might be supposed, has been a very dull one in business circles, although inquiries have been more numerous than for some time past. Orders have been rather scarce, however, and, as a rule, only small quantities have been taken pending the result of the elections. Sellers appear to be of the opinion that their position will be improved by the election of the Republican candidate, while buyers expect to find the market in their favor in case of a Democratic success. Under these conditions it is obvious that very little trading could be expected while the matter is in doubt. From the number of inquiries that have been made, it may be assumed that consumers are very bare of stock, and, while there is nothing in the outlook to indicate more than an ordinary consumption, the probabilities are that the demand will show some little improvement on account of the depleted condition of stocks. Predictions at a time like the present, however, are entirely out of the question, as events during the next 24 hours might completely change the aspect of affairs. Meanwhile there has been no change in prices, and, while holders are anxious for business, rates have been fairly maintained at from \$19 to \$20 for No. 1 Foundry, \$18 @ \$18.50 for No. 2, and \$16.50 @ \$17.50 for Gray Forge, all delivered at tide or its equivalent. Choice brands command the usual premium, while large lots and off grades can be had at concessions according to circumstances.

Foreign Iron.—Nothing doing, and no indications of immediate demand. Prices are nominally about \$19 for Bessemer, \$26.50 for 20 % Spiegel, and \$23 for 10 @ 12 %.

Blooms.—Demand light, and only limited quantities can be placed. Asking prices are as before, viz.: Charcoal Blooms at \$52 @ \$53; Run-out Anthracite, \$43; Scrap Blooms, \$38; Northern Ore Blooms, \$35.

Muck Bars.—A few small lots have been taken at prices ranging from \$28 to \$29 at mill, but there is a general disposition to postpone business until after the election.

Bar Iron.—Business has been confined to the smallest possible limits, and there has been no change from the position as defined last week. Prices are as low as they are likely to be, but consumers and dealers show no disposition to carry stocks, so that the demand is of the same hand-to-mouth character as before. Best Refined Bars are nominally 1.85¢ @ 1.9¢, but cutting in extras is carried on to such an extent that quotations amount to very little in times like these. Medium and common quality Bars are quoted at from 1.6¢ to 1.7¢, but there is very little demand for this class of iron.

Plate and Tank Iron.—A moderately active demand is reported for small lots, but there is nothing to indicate any radical change in the position. Consumers have very few orders on their books at present, and until something additional is offered them there is no probability of much demand for Plate Iron. Meanwhile prices are fairly maintained as last quoted, viz.: Plate Iron, 2.1¢; Tank, 2.15¢ @ 2.25¢; Shell, 2.75¢; Flange, 3.75¢; Fire-Box, 4.25¢; Steel Plates, Flange, 3.5¢ @ 3.75¢; Fire-Box, 4.25¢.

Structural Iron.—Nothing new in the market, and work on several large contracts entered some time ago is still held in abeyance. The probability is that work will be commenced in the course of a few weeks, however, but in the meantime there is very little doing. Prices are about as before, viz.: 2.1¢ for Angles, 2.25¢ for Bridge Plate, 2.75¢ for T's and 3.5¢ for Beams and Channels, subject to the usual discount on large lots.

Sheet Iron.—There is very little change in this branch. The demand continues steady, though comparatively light, and prices are well sustained at about the following figures for small lots, best makes:

Best Refined, Nos. 26, 27 and 28.....	4 1/2
Best Refined, Nos. 18 to 25.....	3 1/2
Common, 1/2" less than the above.....	3 1/4
Best Bloom Sheets, Nos. 22 to 25.....	6 1/4
Best Bloom Sheets, Nos. 16 to 21.....	5 1/4
Common Red Plates, 3-16 to 16.....	8 1/4
Blue Annealed.....	2 1/2
Best Bloom, Galvanized, discount.....	58 1/2
Second quality, discount.....	55 1/2
Common, discount.....	57 1/2

Wrought-Iron Pipe.—There seems to be a good demand for immediate requirements, but no disposition to buy ahead. Prices, while quotably the same as last week, are a trifle more uniform, and would seem to be at about the lowest ebb, although there has been no reaction as yet. Discounts remain as follows: Butt-Welded Black Pipe, 45 %; Butt-Welded Galvanized, 30 @ 35 %; Lap-Welded Black, 60 @ 65 %; Galvanized, 40 @ 45 %; Boiler Tubes, 60 %.

Steel Rails.—The tone of the market is steady, and, under a good demand, prices have somewhat of a hardening tendency. Competition is still very close, but as the mills have a considerable amount of orders on hand, with frequent applications for quotations on additional quantities, the chances seem to favor steady, if not slightly higher, prices. The asking rates are \$28.50 @ \$29 at mill for small lots, with a probability that \$28 would be an inside figure on the most desirable orders likely to be offered. Sales from week to week appear to be fully

equal to the output, with several good-sized lots taken at about \$28.50 at mill. On the whole, therefore, it begins to look as though the extreme point of depression has already been passed and further improvement only a question of time.

Steel Blooms and Slabs.—A fair business in sample lots is being done at about last week's figures, viz.: Nail Blooms (Foreign), \$33 @ \$34 at tide, and \$37.50 @ \$39 for Soft Basic Blooms for special uses. Domestic Slabs are quoted from \$33.50 to \$35 at mill, according to quality. Bessemer Nail Blooms, \$32 @ \$32.50.

Old Rails.—The general condition of the market is about the same as quoted for some weeks past. Buyers are timid, and, unless in absolute need of material, not disposed to bid more than \$17.50, Philadelphia, or \$18.50 @ \$19, delivered at interior points. Sellers are firm, and have so far declined to recede from \$18, Philadelphia, at which they are still offered. A few small lots have been taken at full prices, but holders of round lots have not been able to place them unless by granting concessions of more or less importance.

Scrap Iron.—Market very dull, and only small lots saleable at quoted rates. Choice No. 1 sells at from \$19 to \$20, according to delivery. Wrought Turnings, \$14.50 @ \$15; Machinery Scrap, \$15, and Cast Turnings, \$9.50 @ \$10.

Nails.—With the mild weather enabling builders to continue outdoor work, and the winding up of contracts usual at this time, the nail trade continues fairly active. Prices, however, are weak and irregular. Steel Nails are almost on a par with iron, and in all probability will at no distant day be sold at the same figure; \$2.10 continues the ruling price for ordinary sized lots, but sales are made both above and below that figure in some cases.

Pittsburgh.

Office of The Iron Age, 77 Fourth Avenue,
PITTSBURGH, PA., November 4, 1884.

The general iron trade has been devoid of any new features during the past week; the dullness noted for some time continues, and the prospect is not particularly encouraging for any immediate improvement. The work of putting down wells for natural gas continues unabated. None of those put down in the city have thus far proved successful, but there is a good supply at points varying from 22 to 30 miles distant. Quite a number of our iron mills and glass works have been using this gas for some time past, and it is evident that in all manufacturing establishments where fuel is an item of any considerable magnitude it will be introduced before long to enable them to compete on equal terms with their neighbors. In regard to the labor question there is nothing particularly new to note. The Coal miners in Pools Nos. 1 and 2, Monongahela River, are still out, contrary to general expectation.

Iron Ore.—The Ore trade continues very dull, so far as relates to Pittsburgh, and it is not any better elsewhere. Those consumers whose furnaces are out of blast are not in the mood to anticipate future wants, while those whose furnaces are in operation are buying only as their actual necessities require. The reports from Cleveland continue of a most discouraging character; the receipts continue larger than the shipments, and the supply is steadily accumulating. Prices are still quoted as for several months past, but it is probable that a desirable order could be placed below the rates quoted.

Pig Iron.—Quietude is still the order of the day, and no material activity is looked for just yet. In regard to the immediate future there is difference of views, but it is generally expected that business will pick up as soon as the election excitement has subsided. The consumption, there is reason to believe, has been increasing slightly for some weeks, as many of the puddling furnaces are now working double turn, while production, if anything, is still on the wane, but the supply is still considerably in excess of present wants, and while this is the case there is not likely to be much improvement in price. The situation is exceedingly discouraging to the producing interest, as, in addition to a very light demand, present prices, under the most favorable circumstances, scarcely cover actual cost. We repeat former quotations:

Neutral Gray Forge.....	\$16.00 @ \$16.50, 4 mos.
All-Ore Mill.....	17.50 @ 18.00, 4 "
White and Mottled.....	14.50 @ 15.00, 4 "
Silvery Iron.....	17.50 @ 18.50, 4 "
No. 1 Foundry.....	19.00 @ 20.00, 4 "
No. 2 Foundry.....	17.50 @ 18.00, 4 "
Charcoal, Cold Blast.....	25.00 @ 27.50, 4 "
Bessemer Iron.....	18.50 @ 19.00, 4 "

Muck Bar.—There have been no sales reported during the past week, in the absence of which we repeat former quotations—\$27.50 @ \$28, cash.

Manufactured Iron.—There has been little or no change in the situation during the past week; trade continues light, while prices remain unchanged. It is possible that there will be an improved demand after the election excitement has subsided and people get back to business, but the indications are that there will be no substantial improvement until the spring trade opens up. Prices are quoted at 1.65¢ @ 1.75¢ for Bars; 2.8¢ @ 2.85¢ for No. 24 Sheet; 2.25¢ @ 2.35¢ for Plate; Skelp, 1.8¢ @ 1.85¢, all 30 days, with the usual discount of 2 % for cash.

Nails.—The Nail trade is not in as satisfactory condition as could be desired; in addition to a light demand for the season, prices are unsettled and irregular, the natural result of an active competition.

While manufacturers continue to quote at \$2, 60 days, 2 % off for cash in car lots, it is intimated that sales have been made within the past few days as low as \$1.90, and even \$1.85. Some makers will not sell under our first quotation, but others, there is reason to believe, have sold at the lowest prices quoted. Steel Nails are still quoted 10¢ to 15¢ per keg higher than the Iron Nail.

Wrought-Iron Pipe.—The Pipe mills are nearly all busy; some of them are working up to their full capacity, but it is chiefly on Pipe for local natural-gas companies; aside from this trade is dull, and comparatively few orders coming in from a distance. But for this natural-gas development the Pipe trade, instead of being the most active department of the iron trade, would in all probability be the most depressed. Prices remain about as last quoted. Discounts on Black Butt-Welded Pipe, 40 @ 45 %; Galvanized do., 30 @ 35 %; on Black Lap-Welded, 60 @ 65 %; Galvanized, do., 40 @ 45 %. Selected Pipe or Pipe cut to specified lengths, discount 5 % less than the rates quoted. Two-inch Oil Well Tubing, 12¢ per foot, net; 5 1/2-inch Oil Well Casing, 40¢ per foot, net.

Merchant Steel.—There is a very fair business, but competition is active and prices low. As remarked by an *attaché* of one of the largest mills in the country, orders, instead of coming by mail unsolicited, have to be hunted up. Prices remain about as last quoted, although on desirable orders competition is very sharp. Standard brands of Refined Cast Steel, 9 1/4¢ @ 10¢; Crucible Machinery, 5¢ @ 5 1/2¢; Open Bessemer and Open-Heart do., 2 1/4¢ @ 3¢; Special Plow Steel, 3¢; Crucible, do., 5¢; Syndicate Steel, 8¢. Steel Nail Slabs are quoted at \$30 per ton, cash, at works, and \$31 delivered at mills of consumers in this immediate vicinity. The demand is steadily increasing for Nail Slabs, orders being reported almost every week.

Steel Rails.—Manufacturers here continue to quote at \$28 @ \$29, cash, at mill. It is claimed that \$28 is rock bottom.

Old Iron Rails.—Continue very dull, and in the absence of sales we repeat former quotations, \$19 @ \$20, according to quality and delivery.

Old Steel Rails.—Continue very dull, and mixed lots are still quoted at \$17 @ \$18 per ton.

Crop Ends.—Continue dull; no sales reported for a considerable time. Steel Rail Ends are still quoted at \$18, and Steel Bloom Ends at \$17.50.

Railway Track Supplies.—Continue very dull, and there is not likely to be much, if any, improvement this side of next spring. Prices remain as last quoted. Spikes, 2¢, 30 days; Splice Bars, 1.65¢ @ 1.75¢; Track Bolts, 2 1/4¢ @ 2 1/2¢ per lb.

Scrap.—There is so little doing that it is difficult to give reliable quotations. No. 1 Wrought, \$17.50 @ \$18.50 per net ton; Old Car Axles, \$25 @ 26; Cast Borings, \$11 @ \$12, gross; Old Car Wheels, \$16.50 @ \$17.

Window Glass.—The demand is reported light and prices unchanged. Discount on Single Strength in car lots, 70 and 5 %; do. on Double Strength, 70 and 10 and 5 %.

Coke.—Trade is reported rather better, and there is some talk of the syndicate putting up prices soon, although there is nothing in the position of the Pig-Iron trade to warrant it. We continue to quote Blast Furnace Coke at \$1.10 per ton, free on cars at ovens.

Chicago.

Office of The Iron Age, 36 and 38 Clark St.,
COR. LAKE ST., CHICAGO, November 3, 1884.

Hardware.—As was expected, the week past has not been one of much activity in the Hardware trade. While the cold snap that started the middle of the week previous had improved trade somewhat in certain lines, it was not great enough to bring the average sales up to three weeks ago. The demand for Cutlery, which is usually pretty fair during the month of November, has somewhat improved in the past week. Sheet Iron goods and stove utensils form the greatest bulk of the trade. Demand for Shelf Hardware is very light, and, as buildings are pretty well completed, there is little prospect of any change in this line of goods for the remainder of the season. Prices have generally been pretty steady the last week, changes of a few articles only having been noticed. Flat Head Screws, which were selling at 75 % off, have declined from 5 to 10 %; Sheathing and Planished Copper, 1¢ per lb; Sheet Zinc, from 5 1/2¢ to 5 3/4¢, according to the jobbers' price lists which were issued on the 1st. In other respects the conditions of the market are about the same as a week ago. For the present week there appear to be no indications of improvement, and, if anything, it may be expected to be more quiet than the two preceding weeks.

Barb Wire.—So far as the demand is concerned, there is no change in the condition of the market from what it was a week ago. All buying is done in small lots, which are quoted at 4¢ for Painted and 5¢ for Galvanized. This shows a decline of 1/2¢ during the last week. The endeavor manufacturers are making to place their production in the hands of jobbers is forcing the price to a lower point than it was thought possible for it to go. This effort on the part of manufacturers is having its influence on trade in general, and further declines in a jobbing way are not unexpected. We hear of several large lots which have been offered to

jobbers both in and out of the city that make prices still weaker, and will have a tendency to stop the further production of Wire until a reaction will occur.

Nails.—There is nothing of importance to note in the condition of the Nail market. During the week the demand has been somewhat stronger than for the one previous from small consumers. Small lots from store are quoted at \$2.15 rates; carload orders are quoted at \$2.10, 2 %, 60 days, nominal, as there is no demand from this class of trade that would make a market price. Steel Nails are quoted at 10¢ per keg advance on the price of Iron Nails. Many consumers are taking small lots as experimental orders, and it is generally believed that much of the present Iron Nail trade will be succeeded by Steel Nails when they once have arrived at a more regular and uniform production. Some of the manufacturers of Steel Nails claim advantages in this respect, and are asking higher prices for their Nails than prices quoted. As the manufacture of Steel Nails is comparatively new, and none have arrived at perfection, consumers are unwilling to pay the difference in price, and jobbers, as a rule, are compelled to sell all Steel Nails at the same rates.

American Pig Iron.—A week ago it was generally anticipated that the past week would be one of exceeding quiet and waiting. In this respect sales agents and furnacemen have been agreeably disappointed. The demand for the week has been considerably in excess of the previous week, and the market in general has been steady and less influenced by the political aspect than was noticed two weeks ago. While the market is very quiet, there has been, nevertheless, a fair average of sales. The aggregate for the week amounted to perhaps 5000 tons, a portion of which was sold at higher prices than any that have heretofore been obtained. Several orders that have been standing at a difference of 25¢ between buyer and seller have been closed in the sellers favor. One lot of 1500 tons Lake Superior Coke was sold at figures equal to \$20.50, Chicago delivery, and one lot of 150 tons Ohio mixed was closed at \$21. Southern Irons have not been active, but remain firm at former quotations. Considering the depression of general business, the firmness of the market is almost a surprise to those even who had been fighting for this position. The gradually approaching cold weather will soon stop navigation, which will cut off the delivery from several of the charcoal furnaces which are now in blast and further curtail the production of this class of iron. This, in connection with the fact that Lake Superior Charcoal is not now an over-production, is causing some of the consumers to feel anxious as to where the supply for the winter will be obtained. Many of those who have thus far contented themselves with buying in carload orders are seeking to make special arrangements, and are meeting with little encouragement from manufacturers of this class of iron. We make some changes in our quotations for carload lots, four months, which are as follows: Lake Superior Charcoal, Nos. 1, 2 and 3, \$21.50; Lake Superior Coke, \$20 @ \$21; Cinder, mixed, \$19 @ \$20; Lake Superior and Ohio, mixed, \$20.50 @ \$21; Ohio Standard Black Band, No. 1, at \$21; Southern, No. 1, at \$18.50; No. 2 at \$17.50; Silvery Soft at \$17.50 @ \$19.50; Anthracite, No. 1, at \$21, and No. 2 at \$20. It is a noted fact that on all brands of iron sold in this market prices are more uniform, and that no better concessions can be had on 500 tons or more than are obtained on single carload orders. In fact, furnacemen are less anxious to sell large lots than small, and, whenever possible, buyers are persuaded against large orders extending over 60 to 90 days.

Scotch Iron.—The market for Scotch Iron during the week has been firm, but very little trade has been doing. No changes in the condition of the market or in price have come to note. We continue the following quotations: Summerlee, \$25.50, cash, from yard, and \$24.50 to arrive; Glengarnock, \$25.50 from yard, and \$24 to arrive.

Merchant Steel.—The irregularity which has characterized the Merchant Steel market for months continues to be the only important feature in connection with the trade. Prices are weak and distracted, and buyers continue to exercise the same caution in their purchases and buy the quality which comes nearest to their idea of price. As a rule, makers have given up the idea of any change for the better between this and the 1st of January. While there are a few mills who are well supplied with work, there are many others that are cutting and slashing with a view of obtaining sufficient work to keep them running from week to week. One or two of the mills in the extreme West are giving some attention to the manufacture of Steel Nail Plate, for which they have as yet very little demand. For Best Refined brands from store we quote as follows:

Best Refined Cast Tool Steel.....	5 1/2 @ 5 3/4
Crucible Cast Machinery Steel.....	5 1/2 @ 5 3/4
Open-Heart and Bessemer Steel.....	3 @ 3 1/4
Open-Heart Spring Steel.....	3 1/4 @ 3 1/2
Too-Calk Steel.....	3 1/4 @ 3 1/2
Fire-Box and Boiler Steel.....	3 1/4 @ 3 1/2
Syndicate Steel.....	7 @ 7 1/4

Steel Rails.—Mills continue to quote \$29 @ \$30 as a nominal price on Rails. They say that there is no demand, and the price at which orders would be accepted is merely conjectured.

Old Rails.—The most prominent feature in the Old Rail market seems to be their scarcity. For such small lots as are being sold, about \$18 is the prevailing price. No

sales are made except where it is necessary to realize upon the stock. Companies who have Rails to sell are asking from \$19 to \$20 per ton, and are unwilling to talk about any price below these figures.

Structural Iron.—The demand for this class of iron has been very light during the past week. Buildings for which iron had been contracted are pretty well advanced, and mills usually have made their deliveries of the stock that will be used for other structures during this season. Manufacturers report numerous inquiries on large buildings, both in and out of the city, for early spring delivery. It is likely that some of these will be closed within the next week or 10 days, which would give to those who are fortunate enough to secure orders work to keep them busy during the winter months. We renew quotations as follows, with 1/4¢ @ 1/2¢ added for delivery from stock: Beams, \$3.60; Channels, \$3.60; T Iron, \$3; Angle Iron, \$2.50; Flitch Plates, \$2.50; Frieze Plates, \$2.70.

Bar Iron.—The close competition which has prevailed for several weeks among Bar-Iron manufacturers and the decline in demand have been the means of forcing a further reduction in price. Best Refined New Puddled Iron is now quoted from store at \$1.80 @ 1.85, and to carload trade from mills at about \$1.75 rates. Manufacturers of this class of iron complain that these prices are considerably less than what they can afford to make the iron for, but the stringency of the times has induced them to reduce their prices in preference to running their mills on shorter time. Common iron is quoted from store at \$1.70 rates, and from mills concessions of about 1/8 and 1/16 are made, according to circumstances. Ulster Iron is quoted at \$3.75, with concessions from these figures reported.

Norway Bars.—The Merchant trade in Foreign Bars has been rather quiet for some time past. Importers are quoting \$3.75 @ \$3.90 to all classes of buyers, the lower representing the merchant and the higher price the consumers.

Galvanized Iron.—Since manufacturers are conducting their business irrespective of each other, competition has been growing stronger and prices consequently weaker. The demand for several weeks past has been very light and buying only of a small character. Jobbers have not had much call and their stocks have not been absorbed very rapidly. Manufacturers are making special offers and lower prices are generally noted. From store we continue the following quotations: Juniata, 55 % off; Charcoal, 57 % off, and Refined, 60 % off.

Black Sheets.—Nothing of importance has been developed in the Black Sheet market during the past week. The demand continues to be light and buying principally in small lots. Under this influence makers are weakening, and during the week some good-sized lots have been offered at figures below those refused a month ago. Jobbers, however, discovering this weakness on the part of manufacturers, are not inclined to make any advances, and are of the opinion that they will be able to buy Light Sheet at from \$4 to \$5 a ton less than present quotations before the middle of the present month. We continue the following as jobbers' prices from store: Nos. 10 to 14 at \$2.60 @ \$2.70; No. 16, \$2.80; No. 24 at \$2.80; Nos. 25 and 26 at \$2.90, and No. 27 at \$3.

Old Wheels.—The same conditions rule the market at present that prevailed during the previous week. Business seems entirely at a standstill. Holders are asking from \$1 to \$2 a ton above the price offered. Foundries are nominally quoting \$17.50, but \$18 @ \$19 is the price demanded by those who have wheels and can afford to wait. The firmness in the Pig-Iron market has greatly encouraged holders that they will eventually realize the prices that they are asking at present, and possibly better figures.

Scrap Iron.—The superabundance of stock has been noted during the past month. Scrap dealers dispose of lots at such figures as can be obtained. For lots of coarsely-graded No. 1 few sales are being made at \$15.50, while No. 2 is quoted at \$10.50, with very little demand. We make the following quotations as dealers' purchasing prices: No. 1 Wrought Scrap, per net ton, \$14; Cast Scrap, per net ton, \$11.50; No. 1 Stove-Plate Scrap, per net ton, \$8; Wrought Turnings, per ton, \$8; Cast-Iron Borings, \$6; Old Plow Steel, \$9; Tool Steel, per ton, \$15; Locomotive Steel Tire, per net ton, \$13; Buggy Springs, per net ton, \$14.50; Malleable Scrap, \$5.

EVERETT & POST, 156 Lake street, Chicago, report to us as follows, under date of November 3, 1884: **Pig Lead.**—This week has been a repetition of last. Inquiries few; sales scarce and prices weaker at \$3.40 @ \$3.45, nominally. The public mind is occupied with politics, and manufacturers, as a rule, are holding off until they see which way the wind blows. There is no speculation visible in Pig Lead, which is a good feature, placing the metal on its merits, and with even a moderate demand values would improve, for manufacturers are not carrying large stocks.

Chattanooga.

Office of The Iron Age, Carter and Ninth Sts.,
CHATTANOOGA, November 3, 1884.

Cool weather and rain have brought no perceptible change in the currents or volume of Southern trade. As political excitement rises business becomes more stagnant and dull. None of the industries of this section

Trade Report.

General Hardware.

Since our last review of the market trade has been exceedingly quiet, matters of business being by many merchants laid aside on account of the engrossing interest of political questions. In this condition there are naturally few changes in price to record, and few items of trade interest to mention. But few travelers are on the road at present, most of them having returned home to vote, and on account of the indisposition of the trade to place their orders during the height of the political agitation.

NAILS.

The market shows an improvement in tone and demand over the condition of trade as reported last week. The principal dealers in this locality have been receiving larger orders and more of them, so that they feel encouraged to hope for a continuation of good trade for some time before the usual winter dullness sets in. This improved condition of business is accounted for on the ground that most buyers have not been laying in any stocks in anticipation of the requirements of their customers, but have been steadily pursuing their policy of only purchasing what is absolutely necessary for pressing needs, and consequently they are obliged to continue to send in their orders, notwithstanding the lateness of the season. There are some parties, too, who are influenced by the approach of cold weather and are ordering their stocks now, taking the chances of lower prices in the future and believing that they will save in low rates of transportation now what they might gain in lower prices for Nails further on in the winter, when, of course, they would have to depend on railroad transportation, which is higher than water rates. In some directions the election has interfered with trade, but not so seriously as in other branches of the iron business. The export orders during the week have been very satisfactorily abundant, and some have been of considerable size. There are still one or two outside parties who are offering Nails for carload lots delivered on dock in New York City at prices considerably below those charged for store lots, but the quantity available in this way is small, and the Nails thus offered are as yet not very well known. Some of the largest Eastern factories are firmer in their views, and are notifying their representatives here to insist upon slightly higher prices than they have hitherto obtained. We have previously noticed this inclination in respect to other concerns, and refer to this fact as indicative that the feeling is growing that Nails have been selling entirely too low in comparison with the prices received for other iron products. Quotations are steady on the basis of \$2.10 to \$2.20 from New York store for usual quantities.

BARB WIRE.

The demand in this locality still continues light, and there is general complaint of poor business. A few parties are able to secure orders, but they seem to obtain more than their share of current trade. Prices continue about as they have been quoted for some time, and sellers represent themselves unwilling to reduce their quotations any further, alleging that they prefer to pile up their stock until next spring, believing that the demand will then be sufficiently large to take all that may accumulate during the winter. The production has been curtailed during the past few weeks by failures and fires. Two of these we noted last week. This week we have to report the burning of the factory of H. E. Schnabel & Co., of Chicago, and the failure of the Chicago Galvanized Wire Fence Company. Barb-Wire litigation is becoming more active than it was, and some new features are developed. In the United States Court at St. Louis a question is pending concerning the Burnell patent for Four-Point Wire. This patent is owned by the Iowa Barb Wire Company, of Easton, Pa., and the Iowa Steel Barb Wire Company, of Marshalltown, Iowa. They are confident of establishing the validity of this patent, which is not a reissue, and, if they succeed in securing a favorable decision from the court, they, with the Washburn & Moen Manufacturing Company, will be able to control the manufacture of Four-Point Wire in the States east of Illinois. It will be remembered that the last General Assembly of Iowa appropriated \$5000 to assist the Farmers' Protective Association in its litigation with the Barb-Wire companies. The Merchants' Union sued out a writ of injunction to restrain the State Auditor from drawing a warrant, on the ground that the act was unconstitutional. It is now reported from Iowa that the Supreme Court has decided that the act was constitutional, and therefore the injunction is refused. Quotations in this vicinity continue nominally on the basis of 5½ cents for Galvanized Four-Point and 4½ for Painted, but these rates are shaded considerably for orders of any size.

OUR QUOTATIONS.

The following letter, which has come to us from a well-known jobbing house, we take pleasure in laying before our readers, as it refers to a matter of general trade interest. As the writers do not indicate that it is intended for publication, we refrain from giving their name:

To the Editor of The Iron Age: We would like to inquire whose interests you most wish

to serve (after your own, of course) in giving to the public the lowest prices you can learn have been made by manufacturers and jobbers? Certainly it is not the jobbers' interest to have these matters published broadcast, so that a cut by one city or in one direction is immediately made known to the whole retail trade through the medium of your paper. We are therefore bound to believe that your intent is to serve the interests of the retailers, who naturally constitute the bulk of your subscribers' list. It is not pleasant to write in this way, but the facts will bear us out in our opinion, and, as we cannot see how your paper can do justice to both jobber and retailer, we think it should confine itself to one or the other class, and not attempt to "carry water on both shoulders."

In this communication our correspondents are evidently laboring under erroneous impressions. They are apparently annoyed at some quotations we have made which leave them a narrower margin than they like on some goods, and in the opening paragraph they give expression to the amusing idea that whenever we hear of a cut or a low figure on any line of goods we immediately rush it into print. No, gentlemen, that is not our way. If it were, our quotations would be far lower than they are. The difficulty we have is not in learning the low figures which the manufacturers give on their goods, nor in ascertaining the low figures that are made by the jobbers, the prices at which manufacturers sell and jobbers buy being always within our reach; but to learn the prices at which the goods are generally sold to the class of trade for whom our quotations are made is, in the present condition of the market, sometimes difficult. If our correspondents knew the low figures which we hear, and hear repeatedly, but which we refrain from printing out of regard to the general interests of the trade, instead of finding fault with what we do, they would be disposed to congratulate us on the conservatism of our quotations and the forbearance which we show in making them. We may occasionally give the jobbers a little trouble on certain lines of goods—trouble that, by the way, they have brought upon themselves by their cutting—but if we printed bottom figures it would be a far different matter.

But our esteemed correspondents are laboring under another delusion. They seem to have the impression that *The Iron Age* is, and must be, devoted to the interest of one class or another, retailers or jobbers. This is not the case. As a trade paper we are not devoted to the interests of any one or two classes of our readers, but to the interests of the trade as a whole—manufacturers, middlemen, wholesalers, retailers and the rest. In this effort we have to be guided by our best judgment as to the policy of the paper on all the different questions which are continually coming up, and sometimes, without doubt, we are compelled to adopt a course which may not be in accordance with the views, or possibly the interests, of one or other class of our patrons; but our province, as we conceive it, is in a straightforward way to report the varying methods of business, to chronicle the changing aspects of the market, to revise continually our quotations as the prices change, and in many ways to give such information to our readers as will be of interest to them, and which they can utilize to their advantage. This regard for the interests of the whole trade, as distinguished from a devotion to the interests of any one class, is in the long run the best for all parties, and essential to the permanent usefulness of a paper like ours. So that our correspondents will see that *The Iron Age* cannot be devoted to the interests of the jobbers merely, or to the interests of their customers merely, but that it must occupy an independent and a higher position and fill a larger field. In this way it will be most useful to the whole Hardware trade.

But the communication before us refers especially to our policy in printing quotations of Hardware. Our correspondent might indeed have recalled the statement we have repeatedly made—that we do not give or attempt to give the bottom prices, those at which the largest trade buy; and that on the other hand we are not giving, and do not propose to give, the figures at which only the very small trade are sold, and which would be merely nominal for respectable and representative Hardware dealers. It is best to have it understood that we are endeavoring to give the prices at which the average retail trade can buy their goods, no matter whether they can buy to the best advantage from the manufacturers, or from jobbers who undersell the manufacturers. Our duty is to print the prices at which they can purchase the goods, and the prices which will serve as a guide to let them understand that if they pay a higher figure they pay too much. If the jobber is not able or willing to sell them at the prices which we give, his customers will understand that others are waiting for the orders at those figures. We have indeed been obliged to lower the quotations on many lines of goods on account of the excessive competition between the jobbers, for, when special rates are given freely and almost regularly, the market price of the goods so sold is thereby reduced, and as honest reporters of the market we have to say so.

And in the long run, which, after all, is the test of the wisdom of any policy, this course is unquestionably the best for all concerned. The trade of the present year is characterized by a demoralization in prices greater, perhaps, than any previous year in the history of Hardware, but our readers

will bear us out in the remark that this demoralization was not caused by any quotations we gave, and that we refrained from giving the cut prices until they became notorious and it was necessary to do it or cease publishing quotations altogether. It has indeed been intimated to us by more than one shrewd and experienced observer of the Hardware market that the fact that the jobbers were able to cut under *The Iron Age* quotations had something to do in bringing about the present condition of prices. When the jobbers, with some aid from the manufacturers, had pretty well honeycombed prices, it was high time that we should let the public know what they were doing. Publicity with reference to such matters is sometimes the surest and most effectual remedy. It is for the jobbers to say how much further we shall have to go in the same direction. Not long since a member of one of the largest wholesale Hardware houses in the country expressed the view that it would be a great benefit to the trade, his house and other jobbers included, if *The Iron Age* would be even more radical than it is in giving quotations. In his opinion it would be better for all if prices were quoted closer than they are at present, as then there would not be the margin for cutting which is the bane of the present situation.

But in this matter we purpose to follow the same careful, conservative course which has commended itself to the trade at large and given jobbers little, if any, just cause for complaint. It is an open secret that they have very often taken the liberty of underselling our quotations, and on many lines of goods they are doing the same to-day. When a cut price becomes pretty general, so that a fair retailer can easily obtain it if he is a careful buyer, we feel bound to mention the fact. But, in order not to weaken prices or interfere with the steady and satisfactory movement of trade, we assure our valued correspondents that we shall be in future, as we have been in the past, very conservative in the matter of our quotations, and use the influence of our journal, which is acknowledged to be very great, for the maintenance of prices and the promotion of the best interests of manufacturers, retailers and jobbers. In carrying out the policy which we have thus outlined we think we shall have no difficulty in doing justice to both jobber and retailer. The jobber cannot complain if, saying nothing about the prices at which he purchases his goods, we simply report those at which he sells them, and the retailer will always find *The Iron Age* indispensable in his business if it continues to give the varied information it does concerning the trade, and to quote the prices at which he is entitled to purchase.

NORWAY BOLTS.

Since the adoption of the new list for Norway Iron Carriage Bolts, the condition of the trade has been such that there has been little movement in this as in other lines, but the manufacturers are expecting that with a revival of business they must be receiving orders, and, with the advanced price, at remunerative figures. They justify the advance by the fact that prices for these, as other Bolts have been exceedingly low, and maintain that goods were sold in many instances at and below the cost of production. With a view to establish and maintain better prices, the association to which we have referred was organized and the pool was formed, as we have before advised the trade. The following manufacturers are members of this association: Franklin Moore & Co., Norwich Bolt Works, Welch & Lea, T. Skelly, D. M. Bassett, Peck, Stow & Wilcox, Columbus Bolt Company, Winsted Bolt Company, C. Cowels & Co. and Collwell & Collins Bolt Company. Most of these manufacturers have issued price lists giving the revised lists on Norway Iron Carriage and Tire Bolts. While the manufacturers agree that none of the association should make better discounts than those decided upon for Carriage Bolts, no combination was formed to maintain a uniform price in Whiffletree Spring and Tire Bolts.

MISCELLANEOUS PRICES.

The following is the price list of the Columbus Wrought Steel Wagon Skein, made by Emmick & Hatcher, Columbus, Ohio, the list being subject to a discount of 25 per cent., with an additional 2 per cent. for cash in 10 days:

Price List Per Set.

Size.	With Linch Pins. With Nuts.
2½ x 7½	\$3.04
3 x 8	3.96
3½ x 8	5.96
3½ x 8½	5.96
4 x 9	6.48
4 x 10	6.48
4½ x 10	6.84
5 x 10	7.56
5½ x 10½	7.56
6 x 11	7.92
6½ x 11	8.28
7 x 12	8.96
7½ x 12	9.32
8 x 12	10.00
8½ x 12	11.00
9 x 12	12.00
9½ x 12	12.40
10 x 12	13.40
10½ x 14	14.40
11 x 14	15.40
11½ x 15	16.40
12 x 15	17.40
12½ x 16	18.40

The Columbus Wrought Steel Hood Clip is sold from the following list, subject also to a discount of 25 per cent., with an additional 2 per cent. for cash in 10 days:

Size.	Price per set.
2½ in. 3½ in.	\$0.80
3½ in. 4½ in.	1.00
4 in. 4½ in.	1.10
4½ in. 5 in.	1.20
5 in. 5½ in.	1.30
5½ in. 6 in.	1.40

William Blair & Co., Chicago, under date of October 22, issue a wholesale price current for Hardware and Tinners' Stock. In

their introductory remarks on the first page they say that they intend to give the trade reliable market quotations on some of the leading lines of Hardware, without regard to special prices that may be made by others, either through traveling salesmen or by written or printed quotations, adding that they quote no special prices, but assure those who send their orders direct that their prices will be as low as any for the same goods. Unwarranted Axes they quote at \$6 per dozen; Wrenches, Screw, Malleable, Agricultural and Heavy Wrought, at discount 75 and 10 per cent.; Wringers, Eureka, Iron Frame, per dozen, \$26; Novelty, Wood Frame, per dozen, \$26. The rest of the price current is devoted to season goods, of which illustrations and prices are given, covering such articles as Meat Cutters, Traps, Ice and Roller Skates, Corn Shellers, Axes, Hatchets, &c.

The price on the Rogers Silver-Plated Flat Ware has recently become more firm, and higher prices than have prevailed are named by the manufacturers. Rogers goods are quoted at discount 50 and 5 per cent. for cash in 30 days, or 50 and 6 per cent. for cash in 10 days. The regular price on the Flat Ware of the Wm. Rogers Manufacturing Company, Hartford, Conn., for whom Maltby, Curtis & Co. are agents, at 22 Warren street, in this city, is discount 50 and 5 per cent., with an additional 6 per cent. for cash in 10 days, or 5 per cent. for cash in 30 days. The following are the net prices of the Wm. Rogers Manufacturing Company for their Solid-Silver-Plated Goods, subject to 6 per cent. discount for cash in 10 days, or 5 per cent. discount for cash in 30 days:

Table Knives.	Per Dozen.
Medium Knives.	\$2.35
Dessert Knives.	2.55
Table Knives, Swaged.	3.10
Medium Knives, Swaged.	3.10
Dessert Knives, Swaged.	3.35
Medium Knives, Scimeter Swaged.	3.10
Dessert Knives, Scimeter Swaged.	3.10
Butter Knives.	2.61
Table Fruit Knives, Swaged, Fancy Points.	1.75
Medium Forks.	2.95
Dessert Forks.	2.61
Steel Nut Picks, 2 Bolster, Square or Octagon.	1.75
Nut Cracks, No. 1.	6.25
Nut Cracks, No. 2.	6.50
Nut Cracks, No. 3.	6.50
No. 10 Dessert Knives, 30 cents extra per dozen.	
No. 15 Medium Knives, 40 cents extra per dozen.	

NEW GOODS AND PRICES.

The Barnes Manufacturing Company, for whom Sise, Gibson & Co. are agents, 100 Chambers street, New York, have recently put on the market a very tasty and attractive Padlock made of heavy cast bronze or gun metal in a horse-hoof pattern. For these Padlocks they claim beauty of design, weight, strength, safety and durability, and describe them as thoroughly and carefully constructed and finely finished. The Padlocks have three closely-racked Tumblers, which allow them a great variety of changes. Flat Steel Keys that turn either way are used. The Shackle is held open after being thrown out by the Key. In their construction Phosphor-Bronze Spring Wire is used. They are made both with and without Chain. The list for these unique, handsome and well-made goods is as follows, subject to a discount of 40 per cent.:

Full-Brass Locks.	Per doz.
No. 620, Plain Locks, 3 Tumblers, 2 Flat Steel Keys each.	\$13.80
No. 621, Chain Locks, 3 Tumblers, 2 Flat Steel Keys each.	16.80
With Shoes Steel-Bronzed.	Per doz.
No. 624, Plain Locks, 3 Tumblers, 2 Flat Steel Keys each.	\$15.80
No. 625, Chain Locks, 3 Tumblers, 2 Flat Steel Keys each.	18.80
Extra Keys to Lock, or Sample Key.	2.40
Key Blanks.	1.08
Plain Locks packed 36 dozen in a box. Chain Locks packed 36 dozen in a box.	

The Stanley Rule and Level Company, New Britain, Conn., and 25 Chambers street, New York, are bringing to the attention of their customers, by a new page for their catalogue of 1884, the Rabbit Plane and Filletter, which are illustrated among our Hardware Novelties on page 37. This article is designated as No. 78, and is listed at \$1.50.

The following are the list prices of Daley's Improved Patent Hand-Cuffs, of which we gave an illustrated description in our last issue, and which are manufactured by the Marlin Fire Arms Company, New Haven, Conn., and sold by Schorverling, Daly & Gales, 86 Chambers street, New York. The list is subject to a discount of 25 per cent.:

Polished.	per pair \$4.00
Nickel Plated.	4.75
For three hands, Polished.	6.00
" " Nickel Plated.	7.00

The Globe Combined Weigher, Dipper and Measurer, of which we gave a description among the Hardware Novelties on page 37, is sold at \$7.20 per dozen, subject to a discount of 20 per cent., with an additional 4 per cent. for cash in 10 days, or 2 per cent. for cash in 30 days.

The Penn Lock Works, Philadelphia, for whom Sise, Gibson & Co. are agents, at 100 Chambers street, New York City, have added to the list of their manufactures Heavy English Pattern Wrought Solid End Tower Bolts; also, a new line of Cast Iron Solid End Barrel Bolts (English Pattern) and Wrought Iron Skate Plates. The list for the Heavy English Pattern Wrought Solid End Tower Bolts is as follows, subject to a discount of 40 per cent. to the trade:

4 inch.	5 inch.	6 inch.	8 inch.
\$1.00	\$1.35	\$1.50	\$2.00

The Fenner Hand Scroll or Turning-Out Saw, which is put on the market by the T. G. Conway Company, 20 Warren street, New York, and described among the Hardware Novelties on page 37, is sold at \$3.50 for the Japanned and \$4.25 for the Nickel-Plated, with a discount to the trade of 20 per cent.

The Walkley Hardware Company, Plantsville, Conn., who are not in the combination, have just issued a price list of

TACKS.

This company was established July 8, 1884, with the following officers: L. V. Walkley, president and treasurer; Winfield D. Walkley, secretary; W. R. Walkley, L. V. Walkley, S. S. Scranton, Amos Shepard and C. C. Snedeker, directors. The list is that adopted by the Tack manufacturers September 1, 1883, and covering nearly a full line of Tacks. In presenting this their first catalogue they mention that they give a nearly full list of the different kinds and qualities of Tacks manufactured, some of which, they add, they are not at present making, but hope in the near future to carry a full line. They speak of their goods as second to none in the market, put up in neat boxes with attractive labels, and packed in cases containing the usual quantities. The Tacks comprised in this list are the following: Swedes Iron Tacks Oval and Flat Head, Card and Trimmers', Upholsterers' Tacks, Gimp and Lace Tacks, Swedes Iron Tinned Tacks (all kinds except Gimp Lace and Looking Glass), Tinned Gimp and Lace Tacks, Blued or Bright American Iron Tacks, Swedes Iron Carpet Tacks Flat and Oval Head, Swedes Iron Tinned Carpet Tacks Flat and Oval Head, American Iron Blued or Bright Carpet Tacks Flat and Oval Head American Iron Tinned Carpet Tacks Flat and Oval Head, Brush Tacks, Looking-Glass Tacks, Picture Frame Points, Glaziers' Points, Copper Tacks, Hungarian Nails, Finishing Nails, Machine Finishing Nails, Copper and Brass Finishing Nails, Trunk and Clout Nails, Tinned Trunk and Clout Nails, Copper and Brass Trunk and Clout Nails, Common and Patent Brads, Chair Nails, Basket Nails and Cigar Box Nails. For the convenience of their customers in ordering goods, the list closes with a table showing the quantity of the different sized Tacks which are contained in full boxes.

POPE & STEVENS.

114 Chambers street, New York, are about issuing a new catalogue showing the line of Dog Collars, Muzzles, Roller Skates, Skate Straps, &c., of which they are the manufacturers, and other goods for which they are agents. The line of Dog Collars is full and satisfactory, containing some new patterns, the catalogue giving also some attractive styles of fancy Pug-Dog Harness and other goods. The pamphlet gives also an exhibit of Barney & Berry's Ice and Roller Skates, for which they are agents, and contains illustrations and prices of Miscellaneous Tools and of the Chicopee Automatic Drills.

ITEMS.

The Covert Manufacturing Company, West Troy, N. Y., whose advertisement appears on page 44, report that the sale of their new Snap, which they advertised in these columns some time ago, and of which, as a novelty, we gave a description, has been in advance of their expectations, and speak also of their Chain works as having thus far proved a decided success.

Thomas J. Andrews, 821 Cherry street, Philadelphia, has recently been making large shipments of the Glass Cutters, Potato Parers, &c., of which he is the manufacturer, to leading jobbing houses in England and Australia.

In the monthly price current issued by Hibbard, Spencer, Bartlett & Co., of Chicago, a quarter of the last page is reserved for their patrons' use without charge, and is filled with advertisements of business for sale, positions wanted, &c. Their customers will doubtless appreciate this generous and pleasant feature.

New York Iron Market.

It was natural to expect that the week before the election would exhibit still less activity than its predecessors. While this has been the case in almost every branch of trade, there have been exceptions to the rule. A few buyers seem to have had sufficient confidence in the future, or else their requirements have been so very pressing that they have been prompted to give orders for supplies for several months ahead. It may be possible that they believe that the lowest point in prices has been touched, and therefore they are taking advantage of low quotations at which to place their orders. The majority of purchasers, however, are very timid in this respect, and have been holding off until after the election is decided, even if prices should stiffen after that. We expect a slight renewal of activity from this time forward in consequence of the recent abnormal stagnation in business. A certain amount of iron will be required, no matter what the political condition of the country may be, and, with the election over and the uncertainty ended, orders must be placed for considerable quantities of almost everything. While we do not expect a boom, or anything approaching it, we feel reasonably certain of a considerable degree of activity along almost the whole line in the near future. After that there may possibly be a falling off, which is only natural during the winter months.

American Pig.—Orders generally have been very light during the week. Here and there, however, a buyer has been found with sufficient courage to purchase ahead for some time, and consequently we are able to report a few large sales. One of these is for 4000 tons of Gray Forge Pig Iron; to be

delivered during the next five months, at a little above \$16 at furnace. We have also heard of a few sales of Foundry Irons for delivery during the next four months at current quotations. While the parties who have made these purchases may be actuated by the belief that prices are now at their lowest, and nothing is to be gained by waiting further, most buyers are evidently too timid to place their orders during a time of so much political excitement and uncertainty. A better demand is looked for from this class of customers, now that the election is over. We do not understand that stocks have accumulated to any extent in Eastern districts, and furnacemen seem to be in about as good position for maintaining prices as they have been at any time this fall. Possibly the activity following the settlement of the Presidential election may so strengthen prices that the influence will be felt through the winter. But if this proves to be ill-founded, and November is dull as October has been, a lower range of prices will undoubtedly have to be established or there must be a considerable curtailment of production. At present the indications seem to favor an increased production, as we hear of the blowing-in of several furnaces that have long been standing. We have received a number of additional letters from New England Pig-Iron consumers in reference to the question of the use of Southern and Western Pig Irons. One very large company in Boston writes as follows: "Two-thirds of our present melt is Southern Iron. Two years ago we began to use Virginia Iron. We are now using Virginia, Ohio and Alabama Irons. At the same price we would prefer them to Pennsylvania Iron. The Virginia Iron is fluid, clean and strong. Freight included, Southern Irons cost in New England about the same price charged for Pennsylvania Iron at the nearest tidewater point to the furnace. Ohio Irons come into New England when freight is favor. When special rates are withdrawn the shipment stops." The following letter from a New Hampshire foundry company is of a different character, namely: "At both of our foundries we have for 30 years run almost entirely on Scotch Pig Iron, but this year we have run entirely upon Pig Iron we got from Youngstown, Ohio, and find it equal in every particular, besides being somewhat cheaper. We find it is so with almost all of our neighbors who had been using imported Irons previous to this year. During the 30 years we must have changed our Iron 20 times, but never found anything our men liked except the old grades of Scotch Iron until we got hold of this Iron, but now they are perfectly satisfied and everything runs well. We are just finishing a lot of 400 tons, which is a pretty good trial of it, and as yet have not had any complaint." A foundry company in Southeastern Massachusetts writes: "We will use this year 2200 gross tons of Pig Iron. We have used only 50 tons of Western and Southern Pig Iron—40 of Southern and 10 of Briar Hill Scotch. The Virginia Iron we engaged was good, but we did not use enough of the Ohio Iron to get very much attached to it, preferring the regular Scotch. We did not use Scotch always, but only keep it in stock to use if our mix grows hard. Have used altogether not over 70 tons this year. The Iron we use is No. 1 South Eastern or Sheridan, with No. 2 Crane." Quotations of Standard North River and Lehigh Irons continue as follows, tidewater delivery: No. 1 X Foundry, \$19.50 @ \$20.50; No. 2 X Foundry, \$18 @ \$19; Gray Forge, \$16.50 @ \$17.50. Outside brands are offered about \$1 cheaper.

Scotch Pig.—The receipts at this port during the past week amounted to about 1000 tons, the greater part of which, as usual, was sold to arrive. Some of the Iron was sold from dock at rates somewhat under our quotations, but very little was disposed of in such a way. Sellers feel inclined to hold out for regular prices, inasmuch as the margin is very small between the rates quoted and actual cost. The demand for Scotch Pig is still limited, and sellers are not disposed to force business under the circumstances. Our quotations for small lots are as follows: Coltness, \$22 @ \$22.50; Gartsherrie, \$21 to arrive, \$22 from yard; Shotts, \$21.50 @ \$21.75 to arrive, \$22 from yard; Langloan, \$21.50 to arrive, \$22.50 from yard; Carnbroe, \$20.50 to arrive, \$21 from yard; Glengarnock, \$20.50 to arrive; Summerlee, \$21 to arrive; Dalmellington, \$20 to arrive; Eglington, \$19.25 @ \$19.50 to arrive; Clyde, \$20 to arrive.

Bessemer Pig and Spiegeleisen.—No transactions have taken place during the past week in Foreign Bessemer Pig, and our quotations are wholly nominal at \$18.50 @ \$19 for shipment. The demand for Spiegeleisen has been very limited, quotations continuing nominally at \$26 @ \$26.50 for 20 %. Sales of Domestic Spiegeleisen have been made during the week to the extent of possibly 1500 to 2000 tons. The production of domestic Ferromanganese has assumed such proportions now that the entire trade could probably be supplied at home. The facilities for the domestic manufacture are such now that they could be easily extended if trade would warrant it. Buyers perceive an advantage in being able to buy supplies for immediate delivery, instead of waiting for the arrival of a steamship from abroad.

Bar Iron.—Sales have been made during the week to a moderate extent, and for the time being there is an appearance of somewhat better business, though during the two

or three days immediately preceding the election there was naturally a very decided cessation. It is a remarkable fact that most dealers in Bar Iron report their sales for October as considerably larger than for any one of several preceding months. This shows that the month alluded to was not so bad, in many respects, as current reports inclined us to believe. Prices are not any lower than they have been, but some of the most persistent sellers have recently desisted from their efforts to secure orders, and this in itself has imparted to the market a slight appearance of firmness. It is still possible to buy Common Bar Iron from dock at 1.55¢, and Best Refined from dock at 1.85¢. Mill and store prices are as follows: Best Refined, at mill, 1.65¢ @ 2¢; from store, 1.95¢ @ 2.2¢; Common Iron, at mill, 1.45¢ @ 1.7¢; from store, 1.9¢ @ 2¢.

Structural and Shaped Iron.—No new business of any importance has transpired since our last report. A few contracts are pending for settlement, but it is not known when they will be closed. Small lots are quoted as follows: Angles, from store, 2.3¢ @ 2.6¢; Tees, from store, 2.9¢ @ 3¢; Beams and Channels, on dock, 3.5¢.

Plates.—The general demand has been very light, and but little business has been placed. The market is demoralized to some extent by offerings from the stock of a bankrupt firm in this vicinity at rates somewhat under regular quotations. These are as follows for small lots of Iron Plates: Common or Tank, 2 1/4¢ @ 2.3¢; Refined, 2 1/2¢; Shell, 2 3/4¢; Flange, 3 1/4¢; Extra Flange, 4¢ @ 4 1/4¢. For small lots of Steel Plates quotations are as follows: Tank, 3 1/4¢ @ 4¢; Boiler, 4 1/4¢ @ 5 1/2¢.

Sheet Iron.—The season's business is now about ended, and resumption of activity is not expected until some time toward next spring, the demand in the meantime being expected to partake largely of a retail character. The manufacturers of Galvanized Iron have now very generally adopted but two qualities for quotations, the prevailing discounts for these being 55 % for best quality and 60 % for No. 2 quality. These are prices to the general trade, of course, jobbers receiving their stocks at a rate which enables them to sell to small trade at these prices. Quotations for Black and Galvanized Sheets will be found in our list of New York Wholesale Prices.

Merchant Steel.—Trade is exceedingly quiet, and there seems to be no immediate prospect of improvement. None of the large consumers are expected to be in the market for some time to come. Quotations continue about as follows: American Tool Steel, 9 1/2¢; Tool Steel of special grades and finer quality, 12¢ @ 20¢; Crucible Machinery, 5¢ @ 6¢; Spring and Tire, 3¢ @ 3 1/4¢; Open-Hearth Machinery, 3¢ @ 3 1/4¢; Bessemer Machinery, 3¢; English Tool, 14 1/2¢ @ 15¢.

Steel Rails.—The quantity of Steel Rails sold during the week has amounted to about 10,000 tons. Some of these Rails are for immediate delivery, while others are for delivery at different times during the winter and next spring. The indications are that if the production of Rails during the first six months of next year does not exceed the production during the last six months of the present year, there will be a scarcity of Rails and higher prices. The production of the last half of 1883 is estimated to be about 300,000 tons. This is undoubtedly very much below the necessities of the country, even in depressed times, and, if the production of the first six months of 1885 should be curtailed to this limit, an advance in prices should naturally be expected. The views of sellers are much firmer than they have been, and we hear of no parties willing to sell below \$25, while \$29 @ \$30 is asked by some companies for favorable deliveries. The increasing use of Bessemer Steel in other forms than Rails is causing the Steel companies to be less anxious for Rail orders than they have been. This is not without its influence in holding the price of Rails more firmly.

Steel Wire Rods.—No business is reported under this head, and our quotations are wholly nominal at \$45 @ \$46, according to time of delivery.

Old Rails.—The sales of the week, so far as we can ascertain, have amounted to about 1000 tons of Old T's, in lots of from 40 to 500 tons, at \$16 @ \$16.50 in this vicinity. Some of these lots have been sold delivered to lighter, and others f.o.b. Jersey City. The higher price given is for the latter delivery. We also learn of a sale of 400 tons of Old Street Rails at \$19, delivered to lighter. We quote Old Rails at \$16 @ \$16.50.

Scrap Iron.—Business has been quiet, and no transactions are reported. No. 1 Wrought Scrap from yard continues to be quoted at \$19 @ \$20, according to location.

The Metal Exchange is still suffering from the general stagnation in business, and the consequence is that no sales have occurred on the floor of the Exchange during the past two weeks. There seems to be an absence of speculative interest, just as well as an absence of business in the regular trade. The Exchange was closed on Tuesday of this week, election day being a legal holiday by State law.

Under the head of "Special Notices" will be found the advertisement of Lewander & Co., 12 Post Office Square, Boston, Mass., who offer to users of Swedish Iron some of the finest grades of that class of merchandise,

which they will ship direct from the manufacturer to the consumer, saving the latter the cost of handling and the profits of middlemen. They represent L. G. Bratt & Co., of Gothenburg, Sweden, who have resumed entire control of the "U B" and "A E B" brands of Swedish Lancashire Irons.

No Strike at the Birmingham Mill.

The following letter, which we have received from Jas. G. Caldwell, president of the Birmingham Rolling Mill Company, of Birmingham, Ala., explains itself:

November 3, 1884.

To the Editor of The Iron Age.—SIR: I regret very much to see a very unjust error in your paper of October 30, in which you say: "The Amalgamated employees of the Birmingham rolling mill, Birmingham, have declared a strike against a 10 per cent. reduction. This was formerly one of the strongest association mills in the country, and employed upward of 500 men." You are considerably behind the times, so far as our affairs are concerned. The strike you refer to took place in July, 1883, at which time we were paying 60 cents for puddling, 80 cents for bar-rolling, and so on through the mill in proportion, which prices were, on an average, about 10 per cent. above Pittsburgh prices, and we refused to pay them longer. The consequence was our mills were closed from July, 1883, to latter part of July, 1884, during which time we did everything in our power to bring the strikers (members of the Amalgamated Association) to terms, and even offered a compromise, but they wanted the old price or nothing, so latter part of July, 1884, we sent to Cleveland, Ohio, and the surrounding country and secured a lot of men, took them to Birmingham and started our mills "non-union," since which time we have been running steadily, never losing a day. On June 1 a few union men who had gotten in our mills presented the Amalgamated scale to be signed, which was refused, and those men, together with all others demanding the scale should be signed, were paid off and discharged, though our mills did not lose an hour's work by the kickers, and have run steadily since, not losing a turn's work during the entire summer, and to-day we have as good a set of men as can be found in the county, steady, sober and reliable, working under our printed rules and regulations (a copy of which herewith inclosed), non-union to a man, so far as we know, and we propose and intend in the future to keep clear of the Amalgamated Association, and never allow such an organization among our men again. And in view of the fact that we have had no trouble with our present force of men, and have been running steadily since last February, and propose to continue running as long as we can sell our product, we think your articles does us injustice, for we have published to the world our rules and regulations, which fully and clearly define our position and what we will and what we will not do, and what we require of our men, the breaking of which on our part by demanding a 10 per cent. reduction would be publishing our company as unreliable and tricky, whereas, on the contrary, we have always in the past abided by our agreements honestly and faithfully, and propose to do likewise in the future, and we look to you to correct this error in your next issue and state that our mills are not on a strike. On the contrary, we are running steadily and propose to continue running as long as we can sell our product.

Yours very truly,

JAS. G. CALDWELL, Pres.

The following is a copy of the rules and regulations referred to:

Rules and regulations of the Birmingham Rolling Mill Company, of Birmingham, Ala.

1. This is a "non-union mill," but we pay full union prices according to the flat Pittsburgh scale of prices governing the Pittsburgh (Pa.) district, adopted by the iron manufacturers of Pittsburgh, Pa., and the Amalgamated Association of that city, and we will always continue to pay these prices, subject to the same changes that take place there for the same class of work.

2. We will not allow any organization to exist among our employees by which the management of our business in our mills will be interfered with through a "mill committee," or in any other way.

3. In the event of a strike at Pittsburgh, Pa., in consequence of a failure to agree upon a scale of prices, our employees must continue to work for the old scale until a new one is agreed upon and goes into effect.

4. We guarantee to our employees fair and honest treatment from the management of the mills, and we demand and insist on each and every one in our employ being at his post of duty on time each working day and attending to his business faithfully.

5. Any workman desiring to leave our employ must give one week's notice, and when his time is up he will receive his pay in full; he must then leave without attempting to create trouble of any kind, or cause others to do so for him.

6. We guarantee cash payment every week, holding back only one week's pay in order to give office force time to make up pay-roll.

7. Store orders are not compulsory, only given by special request.

8. Any one who cannot comply with these rules, or who will not comply with them, is most earnestly requested not to begin work if he has not already done so, and, if he has, he must stop work and leave the mill at once.

By order of the Board of Directors.

JAMES G. CALDWELL, President.

July 1, 1884.

We do not demand or require the employees of our mills to sign an "ironclad oath," or any other kind of a contract; but simply require their verbal promise (given in good faith) to live up to and abide by the above rules and regulations.

If any of our employees prefer, we will make individual written contracts with them in accordance with the above rules; but will do this only when specially requested.

For further particulars address John D. Dwyer, superintendent, Birmingham Ala.

JAMES G. CALDWELL, President.

We will merely add that the erroneous information which is the subject of this communication came to us from apparently an authentic source, and therefore it was not verified before publication.

Electric Lighting.

Much of the success which has been achieved in arc lighting is due to the improvement which has been effected in the manufacture of carbon, an art still kept a secret, and by no means yet brought to the perfection of which it is capable. Referring to this point, the London Engineer of recent date remarks that the two greatest defects which arc lighting can have are flickering and noise. Variations in the amount of light are of secondary importance. If a lamp flickers, the defect is simply fatal. As a rule, flickering is not caused by a defect in the lamp, but by the imperfection of the carbons, or the improper manner of using them. It seems to be proved that, on the whole, the best results are got by using carbons about 10 or 11 mm. in diameter below and 12 mm. above, the upper carbon being, of course, the positive, with a current of 8 to 12 amperes, and an electro-motive force of 35 to 40 volts. The horse-power in the

first case will be $\frac{8 \times 35}{746}$, or .37 horse-power.

In the latter case we have $\frac{12 \times 40}{746}$, or, say,

.64 horse-power. This is rather too much

for carbons of the stated size, and it will be found almost impossible to make the lamp burn steadily and without noise. The large current tears the carbon points to pieces. If it is still further augmented flaming sets in, and the light is positively reduced instead of being augmented. Now, every carbon requires a special current and electro-motive force which will give a better result than any other; and when the current is kept small, and the electro-motive force moderately high, absolute steadiness may be secured.

The struggle to get the greatest possible quantity of light out of a lamp has ruined the reputation of many good lamps. No matter what the current may be, some carbons will never burn quietly, the reason being either that gases are occluded in the carbon, or that substances are left in it which will produce them. In estimating the good qualities of a carbon, the first thing to be considered is its conductivity; if this does not exist in a high degree, it must be rejected without ceremony, no matter how good it may be in other respects. It will become very hot when the current passes through it, and will rapidly waste, tapering away to a point from its proper thickness for a length of 2 or 3 inches. The carbon holder of the lamp may be burned, and much mischief done. We have seen carbons quite silent, and giving out a magnificent light, which were worthless because of their high resistance. Attempts are made to get over the difficulty by coppering the carbons by the electrolytic process, but the result is not satisfactory. No adequate explanation of the causes of want of conductivity or the reverse has ever reached us. Two carbons made by the same process, at the same time, and from the same materials, may be found, one of which will prove excellent, while the other will not conduct at all. So far as can be gathered, the conducting power depends more on the molecular structure of the carbon than on anything else.

Conductivity secured, the next thing to be sought for is silence and absence of flickering, and these can be had in only one way, namely, by purifying the coke in the first instance from which the carbons are made. The best material seems to be the linings of gas retorts; but this ought to be treated with caustic potash and carefully washed. This is not the place to go into the details of manufacture. We must content ourselves with general principles. The best carbons and the best lamps will give bad results if, as we have said before, the current is not just right; and one point, frequently neglected, ought to be insisted on, namely, that the speed of the dynamo shall be kept constant. The resistance of the arc varies continually. It is instructive to put a single arc lamp in circuit, and then watch the hand of an amperemeter. This will seldom or never be quite at rest. If the carbon is a bad one, the hand will jump through comparatively large ranges, each sputter of the carbon being attended by a jump. When there are a good many lamps in series, a little overfeeding or a little underfeeding may considerably alter the resistance, and, unless there is plenty of power and a good governor, the result will be unsatisfactory. Thus, for example, let us suppose that a little overfeeding takes place. The resistance is diminished, the quantity of current augmented, and more load is thrown on the engine. If it is properly governed it will keep its speed constant, and the lamps have a chance of recovering themselves. If, on the contrary, the speed falls off, the lamps will get worse and worse. It is only too often assumed that arc lights do not need regular speeds; but this is quite a fallacy. They want it quite as much as the incandescent system.

In the course of an article on "Military Bridges" the Manchester (Eng.) Mechanical World refers to an interesting example where the velocity of a stream was utilized to enable men and materials to be carried across a rapid river. The bridge in question was devised to cross the River Jumna, during the erection of a suspension bridge. A rapid reach near the site of the suspension bridge was selected, the power developed by the water at a high velocity supporting the temporary bridge. The only available material was a quantity of planking 10 feet long, 3 feet 3 inches wide, and 3 inches thick, intended for the floor of the suspension bridge, and some ordinary round timber to be cut from an adjoining forest. Pontoons were made of two single planks placed at a distance of 15 feet apart, each plank being held on edge at an angle of 54° from the vertical, both inclining up the stream; these were kept apart by framing made from the round timber above mentioned. The peculi-

arity of the bridge was that the pressure of the water upon the inclined surfaces of the planks enabled the pontoons to carry a considerable load. The pontoons were moored to a chain 10 feet above the level of the highest flood. The remaining details of the bridge call for no comment, but the bridge was perfectly successful, and took the whole traffic of the road until the completion of the permanent work.

SCIENTIFIC AND TECHNICAL.

A New Caoutchouc.

The attention of the Indian Government, says an exchange, has been called to a tree in Southern India, from which large supplies of caoutchouc can be drawn. This is the "Tuchmig" of the Chinese, or *Prunella glandulifera* of botanists. Unlike the South American tree, from which the caoutchouc is tapped by piercing the bark, the gum is obtained from the new source by breaking the boughs and drawing it out in filaments. If the new caoutchouc is at all equal to the old in insulating properties it will form a timely discovery, for the introduction of electric lighting has created an increased demand for india-rubber coated wires. Indeed, several inventors have lately been engaged in trying to manufacture a substitute for gutta-percha and india-rubber out of oxidized oils—that is to say, oils treated with chloride of sulphur, mixed with asphalt, ozokerit and other insulating substances.

Utilizing Phosphorized Slags. By a modification of Rocour's process for working up phosphorized slags, described in *Ding. Polyt. Journ.*, the slag is melted in a cupla, whereby a matt is obtained containing 20 to 25 per cent. of phosphorus. It is then mixed with powdered anhydrous SO_3Na_2 , and heated to redness. Most of the phosphorus is changed into sodium phosphate, whereas a portion of Fe and Mn is converted into phosphates, sulphides and oxides. The mass is treated with water to recover sodium phosphate by crystallization. The insoluble residue is mixed with Na_2SO_4 and charcoal, and heated in a reducing flame. The Na_2SO_4 is first converted into Na_2S , and then by double decomposition sodium phosphate and FeS and MnS are formed. The mass thus yields another crop of sodium phosphate crystals. The residue, after roasting to destroy the sulphides, can be used as an iron ore rich in Mn. The sodium phosphate is employed for artificial manure. Another method to work the phosphorized matt is to fuse it in a Bessemer converter with dolomite or lime. Alkali can be added to promote the fusing of the metal slag which is formed. Before the complete dephosphorization the slag is decanted, and a fresh portion of lime added to obtain the dephosphorization according to the basic process. The slag contains P_2O_5 , and only little Fe and Mn. It is powdered and used either directly as manure or after treating with SO_2H_2 as superphosphate. The second method yields the P as a product of less marketable value; but as the metal has been converted into steel, its value is said to make up the difference.

Electrical Phenomena of Flames.

The following note from the German of J. Kohlert was published in the "Foreign Abstracts" of the British Institution of Civil Engineers:

The electrification depends on the chemical constitution and the temperature of the muzzle of the burner. Iron in particular appears very strongly negative. The electro-motive force is a function of the position in which the electrode is placed in respect to the flame. The point of greatest electrification coincides with the point of maximum temperature. It is difficult to prove this directly by inserting a platinum wire into different portions of the flame, on account of thermo-electric effects, with which it may be easily confused. Independent observations, however, help to make the point clear. St. Claire-Deville has shown, that in the carbonic-oxide flame the quantity of free carbonic oxide increases as the temperature rises, or otherwise, that the maximum dissociation corresponds to the maximum temperature. Applying these results to the carbonated hydrogen flame, the greatest quantities of free hydrogen and carbonic oxide will occur in the hottest parts. Further, Grove has shown that metals which do not decompose water are very strongly negative in contact with hydrogen and carbonic oxide. These observations only apply to cold metals and gases, but they may be extended to higher temperatures. Hence, at the points of highest temperature in a flame, in consequence of the positive electrification of the platinum, due to the rise of temperature in the wire connecting the molecule of platinum with the burner, positive electricity passes from the burner to the platinum, and, secondly, the introduction of the platinum into the flame, consisting of carbonic oxide and hydrogen, produces a displacement of negative electricity in the opposite direction—i. e., the two effects are added. In the positions of lower temperature, occupied according to St. Claire-Deville by carbonic acid and aqueous vapor which to a slight extent positively excite the platinum, the second effect is masked, and the thermo-electric effect is alone apparent. This also is the case for positions above and at the side of the flame, where the thermo-electric effect is much weaker. It must, however, be remembered that flames have no homogeneous character, and the results must be taken as the mean of a number of observations. In conclusion, the author points out that his results are in close accord with those of Elster and Geitel. They found for the flame of a Bunsen burner that the electro-motive force between a platinum wire outside the flame and a second in the same transverse plane, but introduced as far as the center of the flame, was equal to 1.9 that of a Daniell's cell, and for an alcohol flame 1.44 of a Daniell. The author's results are respectively 1.95 and 1.43.

Moslem Furnace and property, comprising 575 acres of land, including the Moslem ore bank, in Richmond Township, Berks County, Pa., was sold at sheriff's sale on November 1 to Charles Hancock, of Philadelphia, for \$85,000.



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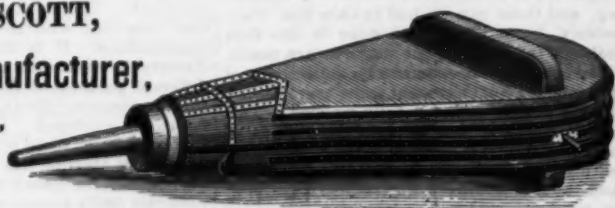
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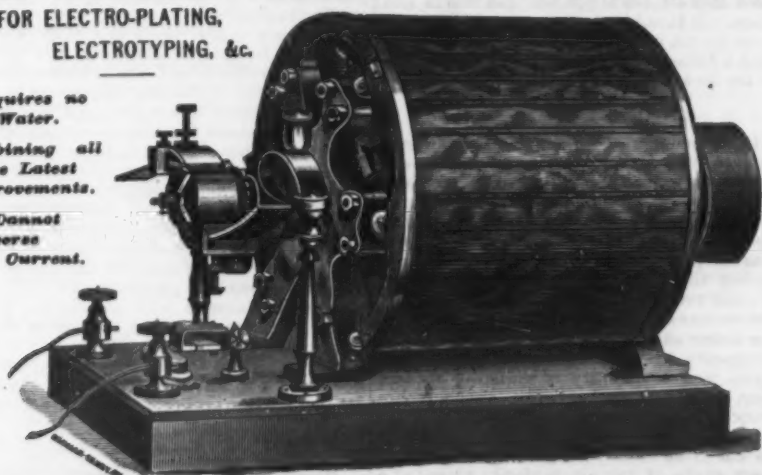
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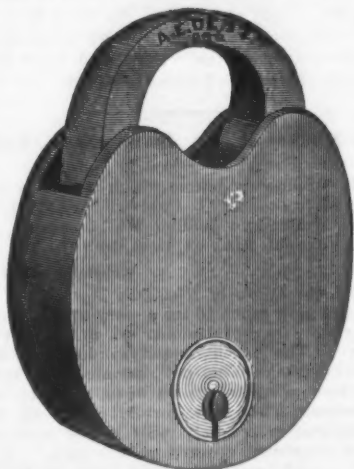
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Tower Bolts.

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English Letter.

(From Our Regular Correspondent.)
LONDON, October 20, 1884.
THE SITUATION

is very much the same as when last reported upon, being no worse, while at the same time it is not possible to report any augmentation of activity. The optimists are rather disappointed. They want to go ahead full speed without any further delay, but the necessary steam is backing, and they, like the rest of us, must needs proceed slowly. Meantime, we have daily reports of the serious distress existing at Sunderland and other places in the North of England, which have been greatly affected by the declining fortunes of the shipbuilding industry. In those towns many thousands of men have been thrown out of work lately, and they, with their unfortunate wives and families, are now almost, or quite, starving. The newspapers published in the locality, as well as the special correspondents of the London papers, give heartrending accounts of the piteous state of affairs. Were the weather at all severe the distress would be vastly deepened, and there is only too much reason for fearing that as winter sets in things will become worse. Subscriptions are being raised for the relief of the distress, and every effort is being made to ameliorate it. That it should have become so bad in so short a time is almost astonishing, seeing that for several years the operative shipbuilders had been in the full enjoyment of constant employment and had earned wages far and away above the pay of ordinary operatives. Many of them are said to have earned \$25, \$30 and some as high as \$75 a week, yet no sooner does a pinch come than they and their families are starving and they have to be relieved at the expense of the general public. If the spread of education should lead artisans to adopt provident habits, a great end will have been attained and the national welfare greatly enhanced. At present they are almost criminally improvident, and are the very children—I might almost use another word—in all the most serious affairs of life.

In Staffordshire the colliers' strike, which lasted many weeks and is estimated to have cost over £150,000 in lost wages and so on, has come to an end without the men having gained their object. They have had all the loss, in fact, and have added one more to the already long list of examples demonstrating the unutterable folly and inutilty of strikes. Herein, also, there is vast room for improvement among our industrial classes. I have now and then mentioned fair trade in this correspondence, and have said that I understood the party of that ilk were very strong at Sheffield. I happened to be in that town the other day as one of the guests at the Citizens' Feast, and had an opportunity of verifying my impressions as to fair trade. The speakers touched on that fiscal heresy at the banquet, and their utterances—especially those of the Earl of Dunraven—were rapturously cheered by those present, who were mainly local manufacturers. I learned that the town is very largely gone over to fair trade, and the manufacturers seem to give it their warmest support—the master cutler, the mayor, &c., being all of that way of thinking. I gathered that they favored retaliatory duties as a means of furthering our manufacturing interests, and that they entirely despair of the success of free trade outside of Great Britain.

The news that the Lackawanna Company have booked an order for the Canadian Pacific for 10,000 tons of rails at \$28.50 per ton, delivered, has caused a great deal of discussion here, coupled with a certain amount of indignation that we, who supply the money, should thus lose the business. It is held that the Lackawanna cannot get a profit at the price, inasmuch as the duty and cost of carriage must bring down the figure at the works to \$26 or lower, which is within a shade of our own prime cost. Anyhow, the price named represents about 10 to 12½ per cent. below what our own manufacturers would have quoted had they been asked to bid for the order.

THE IRON MARKET

has been steady since the quarterly meetings, which seem to have had the effect of confirming the better tone of the past two or three weeks, even if no actual advance in values resulted therefrom. The marked-bar houses no doubt acted wisely in allowing the late nominal quotations to remain unaltered, inasmuch as they are known not to be fully employed, and could not have instituted a rise while they are accepting figures from 5/ to 7/6 below the list rates; apart from which, such an augmentation might have had awkward results as regards labor. Generally speaking, the attitude of the trade may be said to represent the embodiment of a cautious policy, in view of the circumstance that there has been nothing more than a tentative improvement in business yet, while there are many factors which do not favor the hopeful solution of the problem. For the remainder of 1884, therefore, we may expect a period of moderately-sustained activity, which may possibly expand into something better early in the new year, especially if the American market should become brisk after the end of the Presidential election campaign. In the North of England the question of restricting the output of pig iron is again under the consideration of the ironmasters, who appear somewhat undecided whether it would be advantageous to blow a yet further number of furnaces. They are in a somewhat awkward position just now, owing to the dullness of hematites, which virtually prevents them from changing furnaces from Cleveland to that class of pigs. At Glasgow there has been a tolerably good business done this week, warrants having improved on the strength of better shipments, closing at 41/9½ per ton. In special brands of Scotch pig there have been scarcely any changes, Coltness being 60/; Gartsherrie, 56/; Langloan, 58/; Shotts, 54/6; Glengarnock, 50/6; and Eglinton, 44/6 per ton for No. 1 sorts. Connal's stocks compare favorably with those of a year ago, but there may not improbably be a less favorable comparison shortly.

At Middlesboro' the market remains quiet and rather irregular, No. 3 being variously

quoted at 36/3 @ 37/1, with reports in circulation that as low as 35/9 has been accepted in one or two instances. In hematite pig irons there is a shade more firmness, in part by reason of the lessened output in Cleveland and Scotland, and partly owing to the rather better prospects of the rail trade. Mixed lots on the West Coast are still to be had at 43/ @ 44/ per ton in usual proportions. Spiegeleisen up to 20% is quoted at about 77/6 @ 80 per ton. Other grades of crude iron are steady at my last week's quotations, but the amount of new business stirring is not heavy. Heavy manufactured iron is still very dull, some of the rolling mills in the North of England being closed for want of work. The armor-plate mills are fairly engaged. In wire rods there is more doing, while fencing wire is also steadier. Galvanized sheets, plain and corrugated, are about as of late, most of the producers having satisfactory employment, their quotation being supported by the firmness of black sheets and spelter. In ordinary finished iron the week has brought no special variations—bars and hoops being in moderate request, while the sheet mills are pretty well off for work. Quotations are as last reported.

In iron rails nothing is being done save on small orders for South America and India, with a few lots of light sections for colliery and contractors' uses. Heavy wrought scrap is a shade steadier at about 42/6 @ 45/1, f.o.b., old D. H. rails being 50/ @ 52/6; old boiler tubes, 50/ @ 55/1, and old cast iron, 40/ @ 45/ per ton, f.o.b. London, for net cash. Freight to New York are quiet, the rate on pig iron from Glasgow per regular liners being 2/6 @ 3/ per box. The Cambria and Great Western direct liners of steamers from Swansea to New York have put up their freight on tin plates to 10/ per ton for the last two weeks of this month, it having been only 8/6 for the first two weeks. The 5/ or 7/6 freights from Liverpool draw but few tin plates by rail from South Wales. Large quantities are, however, brought to Liverpool by Bacon's steamers from Swansea, as well as by the Llanelly steamers. A steamer is also put on occasionally at Cardiff to bring tin plates round to Liverpool, all of which are transhipped to the States by the various American liners. Steel is in moderate request as a whole, but it seems to be a fact that the best engaged concerns at Sheffield in old crucible branches are those producing large forgings and castings. The Bessemer and Siemens firms are almost all doing a considerable turnover. For old railway leaf-spring steel about 50/ per ton is asked. Crop ends are scarce and dearer. Steel rails have gained a little in tone on the strength of reports that orders aggregating 40,000 tons have been placed within the past few weeks. These reports, no doubt, have some foundation, but it is not clear whether the quantity just named is correctly stated, nor does it appear clear whether the India Office has ordered the 50,000 tons alluded to by me a fortnight ago. Quotations are unaltered, on the basis of £4. 15/ per ton for ordinary heavy sections. Tin plates are fairly steady at recent quotations, but a moderate business only is being transacted, about 3d. per box keeping open numerous negotiations.

THE POSITION OF COPPER AND TIN.

The decline in the values of copper and tin which is taking place is attracting considerable attention, and is a puzzle to many persons who do not comprehend why prices should fall so low when the statistical positions of both these metals are of a distinctly favorable nature. The statistics show that the stocks are much smaller than they have been for a long time past, while the augmented deliveries afford evidence that the consumption of copper is on a very large and increasing scale. In some quarters the existing state of affairs is attributed to the machinations of the "bears" on the London Metal Exchange; but those who are interested in the course of events, while willing to make due allowance for the effects of speculation, are not quite satisfied with that explanation, and think that other causes have been and are at work, with the effects already indicated. So far as copper statistics are in question, the position cannot be deemed other than most favorable. Such being the case, it is plain that the market is influenced by other reasons, and that these reasons are sufficiently weighty to have full effect on all sides. These additional causes I think are easily ascertained on inquiry. In the first place, it is a well-known fact that the triple agreement between the Rio Tinto, Mason and Barry and Tharsis companies will come to an end in December, after which the Rio Tinto authorities are expected to dispose of their enormous stocks of raw materials at the best prices obtainable—that is to say, they have already sold pyrites at lower rates over a period of four years, and will go on selling, quite irrespective of other concerns, as much as the market can absorb at the best prices they can command. Their cost of production is probably the lowest in existence, and they have an almost unlimited supply of ores, so that their openly-proclaimed new departure cannot fail to be regarded as being likely to have effects the precise extent of which may be feared, but not readily fore-shadowed. Then, again, recent intelligence from the United States is also calculated to favor an era of low prices, seeing that your copper-mining concerns are throwing into the market enormous quantities of the metal at figures which are greatly below all recent limits. There is no need for surprise, therefore, at the present level of values, which would be lower in all probability but for the reduced production in Chili since the war, and some interference in Spain, owing to the cholera and quarantine regulation. So far as copper is concerned, therefore, it seems clear that the low prices are the natural outcome of overproduction, which has been much more than sufficient to meet the augmented consumption. The market fears the near future, and operators are allowing things to take their own course as a salutary preparation for what may happen a couple of months hence.

In respect of tin the situation is by no means so free from complications. The latest statistics show that the total stocks of October 1 were 13,527 tons, as against 15,583 tons a year ago, the price being £79. 15/ this year, as compared with £95. 5/ last year on the same date. Deliveries were about the same in the September of each

year, while the stocks were much lighter, whereas values are about £16 per ton lower than last year. Why this should be the case does not appear on the surface, nor am I prepared to offer a feasible explanation further than the suggestion that the "bills" are less formidable than they were a year ago, coupled with which there appears to be a considerable expansion of the output in the Straits. The Chinese holders at Singapore, Penang and Batavia are said to be realizing very freely, and are reported to be doing so on the strength of a larger output, combined with a smaller demand from China. On these heads, however, reports are as yet somewhat obscure, save as to the enlarged output, which appears to be beyond question. The market here in this metal is in the hands of one or two persons only, who are supported by a powerful combination, but their present bearing is somewhat incomprehensible, and cautious men are holding aloof from more than passing operations.

SCOTCH PIG IRON

has been fairly steady during the week, with a slight tendency toward higher values at the close of the week, owing to the good shipping returns and the continued decrease of the reserve stocks. The higher bank rate (3 per cent.) has not had any serious effects so far, money being still abundant and uses for it scarce. Warrants stand at 41/9 @ 41/10 per ton. There are 95 furnaces at work in Scotland, against 104 this date last year. Shipments to date have amounted to 442,492 tons, or a decrease of 74,932 tons, last week's returns having been better than for some months' past. The importations of Middlesboro' pig iron into Scotland this year have been 203,838 tons, or a decrease of 5542 tons as compared with last year. In Connal's stores there are now 581,676 tons of pig iron, as against 589,338 tons this date, 1883. The decrease last week was 856 tons. Current values of makers' brands are about as follows:

Deliverable alongside.	No. 1.	No. 3.
Coltness, f.o.b., Glasgow	39/9	52/
Gartsherrie, " "	35/9	50/6
Langloan, " "	58/	58/
Summerlee, " "	58/6	47/
Carnbroe, " "	50/9	46/9
Chapelhall, " "	55/	40/3
Monkland, " "	48/3	44/9
Clyde, " "	41/6	40/
Quarter, " "	53/	47/
Govan, Port-Dundas, " "	42/6	40/6
Glengarnock, at Ardrossan, " "	50/	49/9
Eglinton, " "	44/	40/6
Dalmellington, " "	47/	48/
Shotts, at Leith, " "	54/6	52/
Kinnell, at Bo'ness, " "	43/6	48/
Carroll, (best selected) at Grange-mouth, " "	52/6

MIDDLESBORO' PIG IRON

is still weak and irregular, the old command of the bears over the market having been strengthened rather than the contrary by the reports that the ironmasters have in contemplation the abandonment of the restriction arrangement. I may say that the rumors to that effect are a little premature, and I have reliable information that the present arrangement will be carried out until the end of February, 1885, when it will be renewed, probably on an enlarged and more extensive scale. Present prices of G. M. B., on usual terms, are as under:

No. 1 Foundry	No. 2	No. 3
39/6	38/	35/6
39/6	38/	35/6
39/6	38/	35/6
39/6	38/	35/6

HEMATITE PIG IRONS

are said to be a shade firmer, on the strength of reports of large sales of rails, and owing to the general indisposition of the smelters to embark in extended deliveries. For mixed lots in usual proportions 43/ @ 44/ is the figure, while West Coast makers' brands are:

No. 1	No. 2	No. 3
45/6	45/6	45/
45/6	45/6	45/
45/6	45/6	45/
45/6	45/6	45/

North of England hematite sorts, f.o.b. Cumberland ports, &c., are quoted:

No. or quality.	Ordinary.	Bessemer.
1.	45/	45/
2.	44/6	44/
3.	44/	44/
4 Foundry.	44/	44/
4 Forge.	43/6	43/6
Mottled.	43/	43/
White.	43/	43/

American Labor the Best in the World.—The London Times of recent date, in speaking of American labor, says: "A comparison has been instituted between the work of a European employee and one in the United States. It appears that employees of the cotton mills in England work up 2014 pounds per annum, and those in Germany from 1200 pounds to 1500 pounds, while the operatives of the United States work up no less than 4350 pounds. The amount of wool worked up in England by each operative averages 1375 pounds; in the United States, 1640 pounds; and in Germany 1000 pounds. In flax the average is 2080 pounds for England and 715 pounds for Germany; in silk, 71 pounds for England, 87 pounds in the United States, and 50 pounds in Germany. It will thus be seen that the operative in the United States works up 100 pounds of cotton to 67 pounds worked up by the English operative and 27½ pounds in Germany; 100 pounds of wool against 77 pounds by the English operative and 60 pounds by the German; 100 pounds of silk against 81½ pounds by the English and 60 pounds by the German operative. It is consequently claimed that, as the American artisan furnishes more work in a given time than the foreigner, he is entitled to the higher wages he receives."

All kinds of ingenious contrivances have been brought forward at different times for the detection of fire-damp in mines, but most of them have been of a very complicated nature. The last of the series, however, is so simple that it seems astonishing that no one thought of it before. A child's india-rubber ball with a hole in it is squeezed flat in the hand and held in the place suspected of fire-damp while released, and allowed to suck in a sample of the air. The ball is now directed toward a safety lamp, and again squeezed, when the tell-tale blue flame will show if it contains any inflammable vapor.

Wholesale Hardware Prices, November 5, 1884.

HARDWARE.

Awls.		
Eagle Awls American.	\$ 106	-dis 20 5
Wright's.	10 6	10 6
Wright's.	10 6	10 6
Armitage Mouse Hole, Extra.	11 25	
Trenton.	11 25	
J. Patterson's.	11 25	
Paterson's.	11 25	
Anvil Vise and Drill.		
Millers Falls Co., \$18.00.	dis 20 5	
Cheney Hall and Vise.	dis 20 5	
Awls Parers.		
Advance.	\$ dos 35 75	
Champion.	\$ dos 35 75	
Family Bay State.	\$ dos 35 75	
Gould.	\$ dos 35 75	
Gold Medal.	\$ dos 35 75	
Improved Bay State.	\$ dos 35 75	
New York Bay State, with pins of.	\$ dos 35 75	
Jersey.	\$ dos 35 75	
Little Star.	\$ dos 35 75	
New York Bay State.	\$ dos 35 75	
Orion.	\$ dos 35 75	
Penn.	\$ dos 35 75	
Pond.	\$ dos 35 75	
Triumph.	\$ dos 35 75	
Turnabout, Original.	\$ dos 35 75	
Waverly.	\$ dos 35 75	
White Mountain.	\$ dos 35 75	
"1876".	\$ dos 35 75	
"1878".	\$ dos 35 75	
Augers and Bits.		
First Quality.	dis 60 00	00 00
Cook's, Douglas Mfg. Co.	dis 55 50	
Cook's, New Haven Copper Co.	dis 55 50	
New York Bay State.	dis 55 50	
Patent Solid Head.	dis 55 50	
Lewis' Patent Single.	dis 55 50	
New York Bay State, Augers and Bits of all kinds.	dis 55 50	
List of January 1, 1884.	dis 55 50	
Imitation Jennings' Bits (old list).	dis 55 50	
New York Bay State, Augers and Bits of all kinds.	dis 55 50	
Carlitz, New Haven Copper Co.	dis 55 50	
Snell Mfg. Co.'s Jennings' Bits (old list).	dis 55 50	
New York Bay State, Augers and Bits of all kinds.	dis 55 50	
Expansive Bit, Ives' No. 4, per doz.	\$ 50	-dis 50 10
Expansive Bit, Blake's.	\$ 50	-dis 50 10
Expansive Bit, Stanley's.	\$ 50	-dis 50 10
Expansive Bit, Ansonia.	\$ 50	-dis 50 10
Hollow Augers, Ives'.	\$ 50	-dis 50 10
Hollow Augers, Stanley's.	\$ 50	-dis 50 10
Hollow Augers, Douglas's.	\$ 50	-dis 50 10
Hollow Augers, Bonney's Adjust.	\$ 50	-dis 50 10
Hollow Augers, Stanley's small size, large.	\$ 50	-dis 50 10
Hollow Augers, Ives' Expansive, each \$4.50.	\$ 50	-dis 50 10
Hollow Augers, Universal Expan., each \$4.50.	\$ 50	-dis 50 10
Wood's.	\$ 50	-dis 50 10
Gimlet Bit, Diamond.	\$ 50	-dis 50 10
Gimlet Bit, Stanley's.	\$ 50	-dis 50 10
Gimlet Bit, Stanley's.	\$ 50	-dis 50 10
Double Cut Gimlet Bit, Ct. Valley Mfg. Co.	\$ 50	-dis 50 10
Double Cut Gimlet Bit, Hartwell's.	\$ 50	-dis 50 10
Double Cut Gimlet Bit, Douglas's.	\$ 50	-dis 50 10
Double Cut Gimlet Bit, Ives'.	\$ 50	-dis 50 10
Bits Bit Stick Drills.	\$ 50	-dis 50 10
Vairo's Ship Augers.	\$ 50	-dis 50 10
Awl Hints.		
Sewing, Iron Ferrule.	\$ 50	-dis 50 10
Sewing, Iron Ferrule.	\$ 50	-dis 50 10
Patent Sewing, Lion.	\$ 50	-dis 50 10
Patent Peg, Plain Top.	\$ 50	-dis 50 10
Awls, Brad Sets, &c.		
Awls, Sewing, Common.	\$ 50	-dis 50 10
Awls, Shouldered Peg.	\$ 50	-dis 50 10
Awls, Shouldered Brad.	\$ 50	-dis 50 10
Awls, Handled Brad.	\$ 50	-dis 50 10
Awls, Socket Scraper.	\$ 50	-dis 50 10
Allen's Set, Awls & Tools.	\$ 50	-dis 50 10
Sargent's Add. Tool Handles, No. 1.	\$ 50	-dis 50 10
Sargent's Add. Tool Handles, No. 2.	\$ 50	-dis 50 10
Brad Set, Stanley's Excelsior, No. 1, \$7.50.	\$ 50	-dis 50 10
Brad Set, Stanley's Excelsior, No. 2, \$4.00.	\$ 50	-dis 50 10
Axes.		
Regular.	per doz \$5.50	\$7.00
Steel, Steel, Bronzed.	add 1.00	
Steel Pole, Bronzed.	add 1.00	
Polished.	add 1.00	
Double Bit Axes.	per doz \$13.00	
Steel Pole, Bronzed.	add 1.00	
Polished.	add 1.00	
Balances.		
Spring Balances.	dis 75 10	00 10
Bells.		
And, Light Brass.	dis 75 10	00 10
And, Extra Heavy.	dis 75 10	00 10
And, Silver Chime.	dis 75 10	00 10
And, Globe (Cone's Patent).	dis 75 10	00 10
And, Yankee.	dis 75 10	00 10
And, Bartons.	dis 75 10	00 10
And, Brooks.	dis 75 10	00 10
And, Sargent's.	dis 75 10	00 10
And, Taylor's Bronzed or Plated.	dis 75 10	00 10
And, Taylor's Japanese.	dis 75 10	00 10
And, Reading.	dis 75 10	00 10
And, Brook's.	dis 75 10	00 1

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	Hammers.....	dis 20
60	Martell's.....	dis 20
80	Cheney's, new list, March, 1883.....	dis 25
90	Barnard Hammer Co.'s Nall Hammers.....	dis 25
00	C. Hammond & Son.....	dis 25
10	Humason & Beckley.....	dis 25
25	Magnetic Tack, Nos. 1, 2, 3, 4, 5, 1.50 and 1.75 dis.....	dis 40
35	Nelson Tool Works.....	dis 40
45	Sargent's Tools.....	dis 40
55	Yates & Plumb.....	dis 40
65	Wilkinson's Smiths'.....	dis 40
75	Henry's Hammers and Sledges.....	dis 40
85	Hand Cuts and Leg Irons.....	dis 40
95	Providence Tool Co., Hand Cuffs, \$15.00 per doz.....	dis 40
00	Providence Tool Co., Leg Irons, \$25.00 per doz.....	dis 40
10	Handles.—Door or Thumb Latches.....	dis 40
20	No.....	dis 40
30	Rogin's Latches.....	dis 40
40	Bronze Iron Drop Latches.....	dis 40
50	Patent Screw-Door Handles.....	dis 40
60	No Plate, \$0.88.....	dis 40
70	Barn Door.....	dis 40
80	Surface Chest.....	dis 40
90	Flush Chest.....	dis 40
00	Lifting.....	dis 40
10	Boynston's Loop Saw Handles.....	dis 40
20	Boynston's Centennial Saw Handles.....	dis 40
30	Brad A.W.....	dis 40
40	Fisher's Firm Chisel, large.....	dis 40
50	Apple Firmer Chisel, assorted.....	dis 40
60	Apple Firmer Chisel, large.....	dis 40
70	Socket Framing Chisel, assorted.....	dis 40
80	File, assorted.....	dis 40
90	Auger, large.....	dis 40
00	Patent Auger, Ives'.....	dis 40
10	Patent Auger, Douglas'.....	dis 40
20	Patent Auger.....	dis 40
30	Hangers.....	dis 40
40	Barn Door, old patterns.....	dis 40
50	Climax (Anti-Friction).....	dis 40
60	South Anti-Friction Wood Track.....	dis 40
70	Challenge.....	dis 40
80	"Champion" Medina Mfg Co.....	dis 40
90	Double Cut, Hartwell's.....	dis 40
00	Victor, No. 1, 416; No. 2, 416.60; No. 3, 418.....	dis 40
10	Kidder's.....	dis 40
20	Terry's Patent.....	dis 40
30	Crank.....	dis 40
40	Architect.....	dis 40
50	Felix.....	dis 40
60	Hamilton Wrought.....	dis 40
70	Anchor (T. & S. Mfg Co.).....	dis 40
80	Renshaw's, list of 14 changed to \$14.00.....	dis 40
90	Fitch's (Bristol), list of 14 changed to \$14.00.....	dis 40
00	Hutchins.....	dis 40
10	Sargent's Patent Guarded.....	dis 40
20	German, old list.....	dis 40
30	German, Sargent's new list.....	dis 40
40	Covert, New Patent, new list.....	dis 40
50	Covered Spring, new list, Oct., 1882.....	dis 40
60	Menely's Imp. German (Old German list), dis 008.....	dis 40
70	Hatchets.....	dis 40
80	Shlinging, Nos. 1, 2, 3.....	dis 40
90	Claw, Nos. 1, 2, 3.....	dis 40
00	Lathing, Nos. 1, 2, 3.....	dis 40
10	Hunt's.....	dis 40
20	Shlinging, Nos. 1, 2, 3.....	dis 40
30	Claw, Nos. 1, 2, 3.....	dis 40
40	Lathing, Nos. 1, 2, 3.....	dis 40
50	Hurd's.....	dis 40
60	Shlinging, Nos. 1, 2, 3.....	dis 40
70	Claw, Nos. 1, 2, 3.....	dis 40
80	Lathing, Nos. 1, 2, 3.....	dis 40
90	Yorkes & Plumb.....	dis 40
00	Shlinging, Nos. 1, 2, 3.....	dis 40
10	Claw, Nos. 1, 2, 3.....	dis 40
20	Lathing, Nos. 1, 2, 3.....	dis 40
30	Underside Edge.....	dis 40
40	Shlinging, Nos. 1, 2, 3.....	dis 40
50	Claw, Nos. 1, 2, 3.....	dis 40
60	Lathing, Solid Steel.....	dis 40
70	C. Hammond & Son, Boston Pattern, 818.....	dis 40
80	Shlinging, Nos. 1, 2, 3.....	dis 40
90	Lathing, Nos. 1, 2, 3.....	dis 40
00	Claw, Nos. 1, 2, 3.....	dis 40
10	Broad, Nos. 1, 2, 3.....	dis 40
20	Simmons.....	dis 40
30	Shlinging, Nos. 1, 2, 3.....	dis 40
40	Lathing, Nos. 1, 2, 3.....	dis 40
50	Broad, Nos. 1, 2, 3.....	dis 40
60	Collins.....	dis 40
70	Shlinging, Nos. 1, 2, 3.....	dis 40
80	Lathing, Nos. 1, 2, 3.....	dis 40
90	Peck's Champion Blade.....	dis 40
00	Lathing, Nos. 1, 2, 3.....	dis 40
10	Claw, Nos. 1, 2, 3.....	dis 40
20	Half.....	dis 40
30	Broad, Nos. 1, 2, 3.....	dis 40
40	A. J. Patten, Nos. 1, 2, 3.....	dis 40
50	"Lightning".....	dis 40
60	Electric.....	dis 40
70	Heat Patent.....	dis 40
80	Hinges.....	dis 40
90	Gate, E. K. E. Reversible.....	dis 40
00	Gate, Clark's, Nos. 1, 2, 3.....	dis 40
10	Gate, Automatic.....	dis 40
20	Gate, Common Sense.....	dis 40
30	Gate, Shepard's, Nos. 1 and 2.....	dis 40
40	Gate, Shepard's, No. 3.....	dis 40
50	Roller Blind Hinges.....	dis 40
60	Roller Plate.....	dis 40
70	Plate Hinges (5, 10, 15 in.).....	dis 40
80	"Providence" over 15 in.....	dis 40
90	Strap.....	dis 40
00	Heavy Welded Hook.....	dis 40
10	Screw Hook and Eye.....	dis 40
20	Wrought Strap and T.....	dis

Horse Shoes.
R. L. Horse Shoe & Forging Imp. ... \$ keg \$3.75 @ 3.87 1/2
Light, Medium and Heavy ... \$ keg \$3.75 @ 3.87 1/2
Walker's Forged, Light, Med. or ... \$ keg \$3.75 @ 3.87 1/2
Mule Shoes ... \$ keg \$4.75 @ 4.87 1/2

Hose, Rubber.
N. Y. Bolting & Packing Co., Standard ... dis 60 ¢

Ice Awls, Chisels, &c.
American Ice Chisel Pol'd ... \$ doz \$3.00, dis 20 ¢
White's Ice Chisel ... \$ doz \$3.25, dis 20 ¢
National's Slicing Hand Pick ... \$ doz \$2.50, dis 20 ¢
Dunlap's Ring Picks ... \$ doz \$2.00, dis 20 ¢
Hick's Ring Picks, Sargent's ... \$ doz \$1.50, dis 20 ¢
Iron Head Picks, Sargent's ... \$ doz \$1.50, dis 20 ¢
Ice Mallets, Pick in handle ... \$ doz \$2.00, dis 15 ¢
Colden's Ice Cast or Malleable ... \$ doz \$1.25, dis 20 ¢
Confection Ice Tools ... \$ doz \$2.00 net

Ice Cream Freezers.
American, Crown and Star ... dis 45 ¢
Gem ... dis 55 ¢

Ice Tonges.
Champion ... \$ doz \$0.80, dis 20 ¢
Family ... \$ doz \$2.75, dis 20 ¢

Kettles
Range 7 to 17 inches inclusive ... \$ ¢ 28¢, dis 15 ¢
Brass larger than 17 inches ... \$ ¢ 32¢, dis 15 ¢
Enamelled and Tea Kettles ... See Hollow-Ware

Knives.
Ames' Butcher Knives ... dis 25 ¢
Nichols' Butcher Knives ... dis 25 ¢
Ames' Shoe Knives ... dis 15 ¢
Ames' Bread Knives ... \$ doz \$1.50, dis 15 ¢
Hick's Bread Knives ... \$ doz \$1.50, dis 15 ¢
Hay and Straw ... dis 15 ¢
Table and Pocket ... See Cutlery

Knobs.
Carriage, Japanese ... \$ gross 80¢, dis 60 ¢
Hemlock Door Knobs, new line ... dis 20 ¢
Door Mineral ... dis 20 ¢
Door Por. Plated ... Same discounts as Door Locks
Door Por. Plated ... 75¢ gross inch, dis 10 ¢
Furniture, Wood ... 75¢ gross inch, dis 10 ¢
Picture, Judd's ... dis 60 ¢
Picture, Sargent's ... dis 60 ¢
Hemlock ... dis 60 ¢
Shutter, Porcelain ... dis 60 ¢

Ladles.
L. Melting, Sargent's ... dis 50 ¢
Melting, Sargent's ... dis 50 ¢
Melting, Monroville ... \$ doz \$5.00, dis 40 ¢
Melting, P. S. & W. ... dis 50 ¢
Eberhard Mfg. Co. ... dis 35 ¢

Lanterns.
Tubular, Standard No. 0, \$ doz ... \$7.50
Tubular, Standard No. 0, \$ doz ... 9.00
Tubular, Lift Wire, No. 0, \$ doz ... 0.00
Guards for Tubular and \$ doz ... 10.50
Tipping Tubular, \$ doz ... 25
Police, Small, \$5.00; Med., \$7.50; Large, \$9.75 ... dis 10 ¢
Pistol ... dis 20 ¢
Owl ... dis 20 ¢

Lawn Mowers.
dis 30 ¢

Lemon Squeezers.
Porcelain Lined ... \$ doz, \$6.00, dis 35 ¢
Food ... \$ doz, \$3.00, dis 35 ¢
Eureka ... \$ doz, \$3.00, dis 35 ¢
Dunlap's Improved ... \$ doz, \$3.00, dis 35 ¢
Sammy ... \$ doz, \$3.00, dis 35 ¢
Kosmos ... \$ doz, \$3.00, dis 35 ¢
Jennings' "Star" ... \$ doz, \$3.00, dis 35 ¢
The "Boss" ... \$ doz, \$3.00, dis 35 ¢
Dean's No. 1, \$ doz, \$15.00; 2, \$5.00; 3, \$5.00 ... dis 55 ¢

Lines.
Line 100, 3, \$7.50; 5, \$10.00 ... dis 35 ¢
Cotton Chalk ... dis 35 ¢
Silver Lake, Braided, No. 0, \$6.00; No. 1, \$6.50; No. 2, \$7.00 ... dis 35 ¢
Masons' Linen ... \$ doz, \$3.00, dis 35 ¢
R. S. ... dis 35 ¢
Masons' Cotton ... dis 35 ¢
Wire Clothes, Galvanized ... each, 25¢ 40¢ net

Locks, Padlocks, Cabinet Locks, &c.
Door Locks, Leuchters, &c. ... dis 60 ¢
Reading Hardware Co. (rev. list Jan. 5, '84), dis 60 ¢
P. May ... dis 60 ¢
Barnes Mfg. Co. ... dis 60 ¢
Yale Flat Key ... dis 60 ¢
Diets Flat Key ... dis 60 ¢
Standard ... dis 60 ¢
Lansford & Crane's ... dis 60 ¢
Flat Key Latches ... dis 35 ¢
Cabinet, Eagle ... Changes made in list price of numbers March 10, 1884, dis 40 ¢
Cabinet, P. & E. Corbin ... dis 35 ¢
Cabinet, A. E. Deitz ... dis 35 ¢
A. E. Deitz, Flat Key Drawer ... dis 40 ¢
Yale new list ... dis 40 ¢
Barnes Mfg. Co. ... dis 40 ¢
Feltner or American ... dis 35 ¢
Eagle Trunk ... dis 35 ¢

PADLOCKS.
Russell & Erwin ... dis 40 ¢
Mallory Wheel ... dis 40 ¢
Nimick & Brittan Mfg. Co. ... dis 40 ¢
Win. Wilcox & Co. ... dis 40 ¢
Norwich ... dis 40 ¢
Yale Lock Mfg. Co. ... dis 40 ¢
Eagle ... dis 40 ¢
Romper's, Nos. 200 to 100 ... dis 40 ¢
A. E. Deitz ... dis 40 ¢
Fram & Lee ... dis 40 ¢
Barnes Mfg. Co. ... dis 40 ¢
Nock's ... dis 40 ¢
Scandinavian ... dis 40 ¢

Lustro.
Four-ounce bottles ... \$ doz, \$1.75; 3, \$1.00 net

Mallets.
Hickory ... dis 10 ¢
Penfield Block Co., Lignumvite and Hickory ... dis 30 ¢

Meat Cutters.
Dixon's (P. S. & W.), Nos. 1, 2, 3, 4 ... dis 40 ¢
Miles' Challenge ... dis 40 ¢
Woodruff's (P. S. & W.), Nos. 100 ... dis 40 ¢
Hales' ... Nos. 11, 12, 13 ... dis 40 ¢
Draw Cut ... dis 40 ¢
Each, \$50.00 75.00 80.00 225.00 400.00 ... dis 30 ¢
American ... dis 30 ¢
Each, \$6.00 7.00 10.00 35.00 50.00 60.00 ... dis 35 ¢
Enterprise ... dis 35 ¢
Each, \$2.00 2.50 4.00 6.00 10.00 ... dis 35 ¢
Kieser's No. 55 ... dis 40 ¢
Kieser's Gem ... dis 40 ¢
Kieser's Butcher ... dis 40 ¢
Silver & Deming ... dis 25 ¢
No. ... 1 2 3 0 ... dis 40 ¢
Beer Shaver (Enterprise Mfg. Co.) ... dis 20 ¢

Mining Kyles.
Am. ... 1 blade, \$7; 2 blades, \$12; 3 blades, \$18 ... Net
Lothrop's ... \$ doz, \$1.00, dis 20 ¢
Bridg's ... \$ doz, \$1.00, dis 20 ¢
Cowles Edw. Co. ... dis 20 ¢

Melasses Gates.
Stebbins' Patterns ... dis 70 ¢
Stebbins' Genuine ... dis 70 ¢
Stebbins' Genuine ... dis 70 ¢
Chase's Hard Metal ... dis 70 ¢
Bush's ... dis 20 ¢
Carroll's Patterns ... dis 15 ¢
Wed's ... dis 15 ¢
Bom No. ... 1 2 3 4 ... dis 10 ¢

Nails.
See Trade Report
Nail Puller ... dis 40 ¢
Curtis Hammer ... \$ doz \$0.00 net
Giant, No. 1 ... \$ doz \$0.00 net

Net.
In lots less than 100 lb, \$ ¢ 14¢ to list; 1 lb boxes, 1¢ to list.
Washers ... 9¢ off list
Washers ... 9¢ off list

Net Crackers.
Table (Harrison & Beckley Mfg. Co.) ... dis 35 ¢
Barnes Mfg. Co. ... dis 35 ¢
Turner & Seymour Mfg. Co. ... dis 35 ¢

Oakum.
Dis on 100 bales and over, 1/2 ¢ lb
Best ... \$ ¢ 10¢
U. S. Navy ... \$ ¢ 10¢
Navy ... \$ ¢ 10¢

Oilers.
Zinc and Tin ... dis 60 ¢
Brass and Copper ... dis 50 ¢
Amble ... dis 50 ¢
No. 3, \$4.00 \$ doz ... Net
Prior's Patent or "Paragon" Zinc ... dis 60 ¢
Prior's Patent or "Paragon" Brass ... dis 60 ¢
Olmsted's Tin and Zinc ... dis 60 ¢
Olmsted's Brass and Copper ... dis 60 ¢
Broughton's Brass ... dis 60 ¢

Picking, Steam.	
N. Y. Belling & Packing Co.	dis 50.10
Peach Papers.	
Henry Knapp	dis 10
Diamond State	dis 10
Pencil.	
Faber's Carpenters	high list, dis 50
Faber's Round Gill	dis 50
Dixon's Lead	dis 50
Dixon's Lead	dis 50
Dixon's Carpenters	dis 50
Picks.	
Railroad, 5 to 6, 11.00; 6 to 7, 11.25; 7 to 8, 11.50; 8 to 9, 12.00; 9 to 10, 12.25; 10 to 11, 12.50; 11 to 12, 13.00; 12 to 13, 13.25; 13 to 14, 13.50; 14 to 15, 14.00; 15 to 16, 14.25; 16 to 17, 14.50; 17 to 18, 14.75; 18 to 19, 15.00; 19 to 20, 15.25; 20 to 21, 15.50; 21 to 22, 15.75; 22 to 23, 16.00; 23 to 24, 16.25; 24 to 25, 16.50; 25 to 26, 16.75; 26 to 27, 17.00; 27 to 28, 17.25; 28 to 29, 17.50; 29 to 30, 17.75; 30 to 31, 18.00; 31 to 32, 18.25; 32 to 33, 18.50; 33 to 34, 18.75; 34 to 35, 19.00; 35 to 36, 19.25; 36 to 37, 19.50; 37 to 38, 19.75; 38 to 39, 20.00; 39 to 40, 20.25; 40 to 41, 20.50; 41 to 42, 20.75; 42 to 43, 21.00; 43 to 44, 21.25; 44 to 45, 21.50; 45 to 46, 21.75; 46 to 47, 22.00; 47 to 48, 22.25; 48 to 49, 22.50; 49 to 50, 22.75; 50 to 51, 23.00; 51 to 52, 23.25; 52 to 53, 23.50; 53 to 54, 23.75; 54 to 55, 24.00; 55 to 56, 24.25; 56 to 57, 24.50; 57 to 58, 24.75; 58 to 59, 25.00; 59 to 60, 25.25; 60 to 61, 25.50; 61 to 62, 25.75; 62 to 63, 26.00; 63 to 64, 26.25; 64 to 65, 26.50; 65 to 66, 26.75; 66 to 67, 27.00; 67 to 68, 27.25; 68 to 69, 27.50; 69 to 70, 27.75; 70 to 71, 28.00; 71 to 72, 28.25; 72 to 73, 28.50; 73 to 74, 28.75; 74 to 75, 29.00; 75 to 76, 29.25; 76 to 77, 29.50; 77 to 78, 29.75; 78 to 79, 30.00; 79 to 80, 30.25; 80 to 81, 30.50; 81 to 82, 30.75; 82 to 83, 31.00; 83 to 84, 31.25; 84 to 85, 31.50; 85 to 86, 31.75; 86 to 87, 32.00; 87 to 88, 32.25; 88 to 89, 32.50; 89 to 90, 32.75; 90 to 91, 33.00; 91 to 92, 33.25; 92 to 93, 33.50; 93 to 94, 33.75; 94 to 95, 34.00; 95 to 96, 34.25; 96 to 97, 34.50; 97 to 98, 34.75; 98 to 99, 35.00; 99 to 100, 35.25; 100 to 101, 35.50; 101 to 102, 35.75; 102 to 103, 36.00; 103 to 104, 36.25; 104 to 105, 36.50; 105 to 106, 36.75; 106 to 107, 37.00; 107 to 108, 37.25; 108 to 109, 37.50; 109 to 110, 37.75; 110 to 111, 38.00; 111 to 112, 38.25; 112 to 113, 38.50; 113 to 114, 38.75; 114 to 115, 39.00; 115 to 116, 39.25; 116 to 117, 39.50; 117 to 118, 39.75; 118 to 119, 40.00; 119 to 120, 40.25; 120 to 121, 40.50; 121 to 122, 40.75; 122 to 123, 41.00; 123 to 124, 41.25; 124 to 125, 41.50; 125 to 126, 41.75; 126 to 127, 42.00; 127 to 128, 42.25; 128 to 129, 42.50; 129 to 130, 42.75; 130 to 131, 43.00; 131 to 132, 43.25; 132 to 133, 43.50; 133 to 134, 43.75; 134 to 135, 44.00; 135 to 136, 44.25; 136 to 137, 44.50; 137 to 138, 44.75; 138 to 139, 45.00; 139 to 140, 45.25; 140 to 141, 45.50; 141 to 142, 45.75; 142 to 143, 46.00; 143 to 144, 46.25; 144 to 145, 46.50; 145 to 146, 46.75; 146 to 147, 47.00; 147 to 148, 47.25; 148 to 149, 47.50; 149 to 150, 47.75; 150 to 151, 48.00; 151 to 152, 48.25; 152 to 153, 48.50; 153 to 154, 48.75; 154 to 155, 49.00; 155 to 156, 49.25; 156 to 157, 49.50; 157 to 158, 49.75; 158 to 159, 50.00; 159 to 160, 50.25; 160 to 161, 50.50; 161 to 162, 50.75; 162 to 163, 51.00; 163 to 164, 51.25; 164 to 165, 51.50; 165 to 166, 51.75; 166 to 167, 52.00; 167 to 168, 52.25; 168 to 169, 52.50; 169 to 170, 52.75; 170 to 171, 53.00; 171 to 172, 53.25; 172 to 173, 53.50; 173 to 174, 53.75; 174 to 175, 54.00; 175 to 176, 54.25; 176 to 177, 54.50; 177 to 178, 54.75; 178 to 179, 55.00; 179 to 180, 55.25; 180 to 181, 55.50; 181 to 182, 55.75; 182 to 183, 56.00; 183 to 184, 56.25; 184 to 185, 56.50; 185 to 186, 56.75; 186 to 187, 57.00; 187 to 188, 57.25; 188 to 189, 57.50; 189 to 190, 57.75; 190 to 191, 58.00; 191 to 192, 58.25; 192 to 193, 58.50; 193 to 194, 58.75; 194 to 195, 59.00; 195 to 196, 59.25; 196 to 197, 59.50; 197 to 198, 59.75; 198 to 199, 60.00; 199 to 200, 60.25; 200 to 201, 60.50; 201 to 202, 60.75; 202 to 203, 61.00; 203 to 204, 61.25; 204 to 205, 61.50; 205 to 206, 61.75; 206 to 207, 62.00; 207 to 208, 62.25; 208 to 209, 62.50; 209 to 210, 62.75; 210 to 211, 63.00; 211 to 212, 63.25; 212 to 213, 63.50; 213 to 214, 63.75; 214 to 215, 64.00; 215 to 216, 64.25; 216 to 217, 64.50; 217 to 218, 64.75; 218 to 219, 65.00; 219 to 220, 65.25; 220 to 221, 65.50; 221 to 222, 65.75; 222 to 223, 66.00; 223 to 224, 66.25; 224 to 225, 66.50; 225 to 226, 66.75; 226 to 227, 67.00; 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635 to 636, 169.25; 636 to 637, 169.50; 637 to 638, 169.75; 638 to 639, 170.00; 639 to 640, 170.25; 640 to 641, 170.50; 641 to 642, 170.75; 642 to 643, 171.00; 643 to 644, 171.25; 644 to 645, 171.50; 645 to 646, 171.75; 646 to 647, 172.00; 647 to 648, 172.25; 648 to 649, 172.50; 649 to 650, 172.75; 650 to 651, 173.00; 651 to 652, 173.25; 652 to 653, 173.50; 653 to 654, 173.75; 654 to 655, 174.00; 655 to 656, 174.25; 656 to 657, 174.50; 657 to 658, 174.75; 658 to 659, 175.00; 659 to 660, 175.25; 660 to 661, 175.50; 661 to 662, 175.75; 662 to 663, 176.00; 663 to 664, 176.25; 664 to 665, 176.50; 665 to 666, 176.75; 666 to 667, 177.00; 667 to 668, 177.25; 668 to 669, 177.50; 669 to 670, 177.75; 670 to 671, 178.00; 671 to 672, 178.25; 672 to 673, 178.50; 673 to 674, 178.75; 674 to 675, 179.00; 675 to 676, 179.25; 676 to 677, 179.50; 677 to 678, 179.75; 678 to 679, 180.00; 679 to 680, 180.25; 680 to 681, 180.50; 681 to 682, 180.75; 682 to 683, 181.00; 683 to 684, 181.25; 684 to 685, 181.50; 685 to 686, 181.75; 686 to 687, 182.00; 687 to 688, 182.25; 688 to 689, 182.50; 689 to 690, 182.75; 690 to 691, 183.00; 691 to 692, 183.25; 692 to 693, 183.50; 693 to 694, 183.75; 694 to 695, 184.00; 695 to 696, 184.25; 696 to 697, 184.50; 697 to 698, 184.75; 698 to 699, 185.00; 699 to 700, 185.25;	

WHOLESALE METAL PRICES, November 5, 1884.

METALS.

IRON.—Duty: Bars, 8-10¢ to 11-10¢ per lb.; provided that no Bar Iron shall pay a less rate of duty than 85¢. Sheet, 11-0¢ to 15-10¢ per lb. Band, Hoop and Scroll, 16 to 14-10¢ per lb. Railroad Bars weighing more than 25 lb. yard, 7-10¢ of 16 lb.

Standard American Pig Iron.

Foundry No. 1 X..... \$19.50 @ 20.50
Foundry No. 2 X..... \$18.00 @ 19.00
Gray Forge..... \$16.50 @ 17.50

No. 1 Scotch Pig Iron.

Carnbroe..... \$20.00 @ 21.00
Coltess..... \$20.00 @ 21.00
Shotts..... \$20.00 @ 21.00
Glenbrook..... \$20.00 @ 21.00
Glenbrook..... \$20.00 @ 21.00
Langloan..... \$20.00 @ 21.00
Summerlee..... \$20.00 @ 21.00
Dalmellington..... \$20.00 @ 21.00
Eglinton..... \$20.00 @ 21.00
Clyde..... \$20.00 @ 21.00

Rails.

Steel, at Eastern mills..... \$28.00 @ 30.00
Old Rails, T. S..... \$16.00 @ 16.50

Scrap.

Wrought, per ton, from yard..... \$19.00 @ 20.00

Bar Iron from Store.

Common Iron:
1/4 to 1 in. round and square..... \$1.00 @ 1.05
1 to 6 in. x 1/4 to 1 in...... \$1.00 @ 1.05

Refined Iron:
1/4 to 1 in. round and square..... \$1.05 @ 1.10
1 to 6 in. x 1/4 to 1 in...... \$1.05 @ 1.10

Rods—1/4 and 1/2 in. round and square..... \$2.00 @ 2.10
Rods—3/4 and 1 in. round and square..... \$2.00 @ 2.10

Bands—1 to 6 in. round and square..... \$2.00 @ 2.10
Bands—7 to 12 in. round and square..... \$2.00 @ 2.10

"Burden's Best" Iron, base price..... \$2.00 @ 2.10
"Burden's" H. B. & S. Iron, base price..... \$2.00 @ 2.10

Norway Nail Rods..... \$2.00 @ 2.10

Sheet Iron from Store.

Common American..... \$2.00 @ 2.10
Common Cleaned..... \$2.00 @ 2.10

Nos. 10 to 16..... \$2.00 @ 2.10
Nos. 17 to 20..... \$2.00 @ 2.10

21 to 24..... \$2.00 @ 2.10
25 and 26..... \$2.00 @ 2.10

27..... \$2.00 @ 2.10
28..... \$2.00 @ 2.10

Galvanized, 10 to 30..... \$2.00 @ 2.10
Galvanized, 21 to 24..... \$2.00 @ 2.10

Galvanized, 25 to 28..... \$2.00 @ 2.10
Galvanized, 29..... \$2.00 @ 2.10

Galvanized, 30..... \$2.00 @ 2.10
American Russia..... \$2.00 @ 2.10

Russia..... \$2.00 @ 2.10
American Cold Rolled B. B..... \$2.00 @ 2.10

Iron Wire. See Wire.

TEEL.—Duty: Ingots, Bars, Sheets, &c., valued at 4¢ per lb. or less, 45¢ ad. val.; valued above 4¢ and not above 7¢ per lb., 55¢ ad. val.; valued above 7¢ and not above 10¢ per lb., 65¢ ad. val.; valued above 10¢ per lb., 75¢ ad. val. Extra—Steel Bars, Rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, 14¢ per lb. in addition to above; Steel Circular Saw Plates, 1¢ per lb. in addition to the above.

American Cast Steel.

For American Steel, see Pittsburgh quotations.

English Steel.

Best Cast..... \$1.00 @ 1.10
Extra Cast..... \$1.00 @ 1.10

Circular Saw Plates..... \$1.00 @ 1.10
Round Machinery, Cast..... \$1.00 @ 1.10

Swaged, Cast..... \$1.00 @ 1.10
Best Double Shear..... \$1.00 @ 1.10

Blister, 1st quality..... \$1.00 @ 1.10
German Steel, Best..... \$1.00 @ 1.10

3d quality..... \$1.00 @ 1.10
Sheet Cast Steel, 1st quality..... \$1.00 @ 1.10

2d quality..... \$1.00 @ 1.10
3d quality..... \$1.00 @ 1.10

TIN.—Duty: Plates, Sheets, Taggers and Termes, 1¢ per lb.; Bars, Block and Pigs free.

Strains..... \$1.00 @ 1.10
English..... \$1.00 @ 1.10

Bar..... \$1.00 @ 1.10

Charcoal Tin Plates.

C 10x14, 25 sheets..... \$5.00 @ 5.50
C 12x18, 1..... \$11.00 @ 12.75

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C 10x14, 25 sheets..... \$5.00 @ 5.50
C 12x18, 1..... \$11.00 @ 12.75

LEAD.—Duty: Pig, \$2 per 100 lb.; Old Lead, 3¢ per lb.; Pipe and Sheet, 3¢ per lb.

American..... \$4 @ 4.125
Bar..... \$4 @ 4.125

Pipe..... \$4 @ 4.125
Tin Lined Pipe..... \$4 @ 4.125

Sheet..... \$4 @ 4.125
Shot..... \$4 @ 4.125

Chilled Shot..... \$4 @ 4.125

ANTIMONY.
Hallett's..... \$11 @ 11.50
Cookson..... \$11 @ 11.50

SPELTER.—Duty: Pigs, Bars and Plates, \$1.50 per 100 lb.

American, cash..... \$4 @ 4.125
Bergentown..... \$4 @ 4.125

ZINC.—Duty: Pig or Block, \$1.50 per 100 lb.

Sheet, 24¢ per lb.
Zinc—Open..... \$5.50 @ 5.625

Zinc Tubing—Dis. 25¢.

Plain..... \$27
Fancy..... \$30

Scotch and Extra Patterns..... \$30

BARBITT METAL.
N. P. U..... \$7 @ 7.50
A. 25¢; B. 25¢; C. 14¢.

WIRE.
Iron Wire.—Put up in 63 lb. bundles.

Nos. 00 to 9, 10, 11, 12, 13, 14, 15, 16, 17, 18.

Bright Market Wire..... \$1.15 @ 1.25
Charcoal..... \$1.15 @ 1.25

Bale Wire, Nos. 7 to 12..... \$1.15 @ 1.25
Annealed Market Wire..... \$1.15 @ 1.25

Fence Wire, Nos. 8 and 9..... \$1.15 @ 1.25
Bessemer Steel Wire..... \$1.15 @ 1.25

Coppered Market Wire..... \$1.15 @ 1.25
Bale Wire, Nos. 7 to 12..... \$1.15 @ 1.25

Galvanized Market Wire..... \$1.15 @ 1.25
Fence Wire..... \$1.15 @ 1.25

Stone or Weaving Wire.
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Cents..... \$1.15 @ 1.25
Nos. 27 28 29 30 31 32 33 34 35 36

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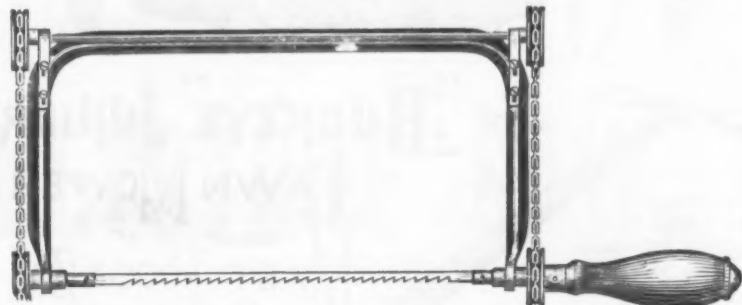
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C

HARDWARE NOVELTIES.

The Fenner Hand Scroll or Turning-Out Saw.

This article, which is made under a recent patent and is just put on the market, is an improvement on the bow saw. It is manufactured and sold by the T. G. Conway Company, 20 Warren street, New York. The improvement, as is evident from the accompanying illustration, consists in the mechanism by which both ends of the saw are turned by one movement of the handle, thus keeping the blade straight and preventing its twisting. By a reference to the cut it will be seen that this is accomplished by means of chains which pass over pulleys, two



The Fenner Hand Scroll-Saw.

of which are attached to the spindles which hold the saw, and two to the shaft by which the motion is communicated. By this device the motion imparted to the handle in turning it is communicated by means of such shaft and chains to the end of the saw opposite to the handle, the spindles at either end of the saw always moving together, thus keeping the blade straight and true. At the outer end of the handle it will be perceived that there is a screw by means of which the saw can be strained. The guides which hold the shaft, it will also be observed, are slotted for the purpose of taking up any slack in the chains. The utility of this article is apparent, and it will be found useful for stair-builders, pattern and cabinet makers or other workers where a scroll-saw is required, and will also serve for amateur foot-saw work. It can easily be carried in the carpenter's tool-box, and can be used with stuff of different thicknesses. It is made japanned and nickel-plated, the prices for the different styles being given in the Trade Report.

The Globe Combined Weigher, Dipper and Measure.

The illustration which we give herewith represents an article which is put upon the market by the Globe Manufacturing Company, 326 Walnut street, Philadelphia. It is described as made of the best gray iron and

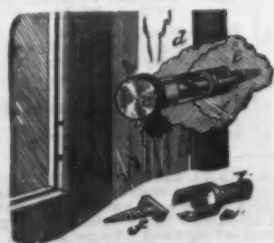


The Globe Combined Weigher, Dipper and Measure.

finest quality of tin. Its general arrangement and method of operation will be understood from the cut. On one end of one of the arms of the castings a beaded circle is cast to receive the tin vessel, which is secured thereto by two L-shaped grips soldered on the bottom of the tin and clamping on the casting. This tin vessel is gauged to hold and measure 1 pint. The other casting is pointed, as indicated on the cut. At the handle end these two arms are hinged together, as shown. When the dipper is held by the handle the spring is so gauged that the weight of the tin will make the point of the upper arm to stand at zero, but when ½ pound is in the tin vessel the pointer will stand at the ½-pound mark, and thus with other weights, the spring causing the arms to automatically adjust themselves so as to indicate upon the scale the exact weight of material supported. The manufacturers speak of this utensil as weighing and measuring accurately, as they are careful in the manufacture of it to secure this result. They design it to take the place in the kitchen of scales which are now required, and to serve also as a dipper and measurer. They direct attention to the moderate price at which it is sold, and refer to the convenience of such an article in the kitchen. The price at which it is offered to the trade is given in the Trade Report.

Fastening for Window Heads.

A novel article of Builders' Hardware, which will no doubt be appreciated by all who have occasion to use such a device, is shown in the engraving. It is a fastening



Fastening for Window Heads, Made by Brobst & Neumeier, Macungie, Pa.

ing for window heads, so constructed as to render the head readily detachable for the purpose of removing the sash for cleaning or for any other purpose. The view in the upper portion of the cut shows the device as it is placed upon the window, while the detached sections at the bottom show the parts of which the fastening is composed. For the purpose of putting this fastener in place, holes about ¼ inch in dia-

meter are bored through the head and a short distance into the frame. Into the holes bored in the frame the screw part *f*, shown in the cut, is inserted. The outer end of the fastening is placed in the hole in the head, and is securely held there by means of a small brad driven through the edge of the head from the inside. The shape of the parts and the general arrangement is such that the projecting end locks on to the screw part *f* upon the former being turned. A milled end or a modified thumb-screw end is provided for this purpose. A bead may be very readily removed when fastened by this means, while the fastening itself is, to say the least, far more ornamental in appearance than the unsightly projecting nails which are frequently employed in the same

Improved Door Locks.

The Nashua Lock Company, whose factory is at Nashua, N. H., and whose general offices are at 36 Pearl street, Boston, and 148 Lake street, Chicago, are introducing a Front Door Lock containing important improvements, a general view of which is afforded by Fig. 1 of the engravings. Figs. 2, 3 and 4 are details of the working parts. In directing attention to these goods the company refer particularly to the reversible swivel-spindle hub, which is the leading feature. The hub, a detail of which is shown in Fig. 3, is made with one-half containing a ¾-inch hole, and the other half a ½-inch hole. The spindle is made of corresponding dimensions, and is of the form shown in Fig. 2. The jaws by which the outside knob is kept from operating the door are on the part of the hub having the ¾-inch hole. Since the lock is rever-

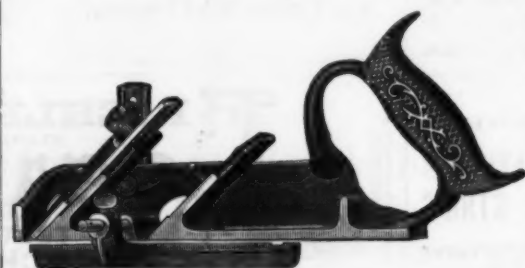


Fig. 2.—Detail of Swivel Spindle.

sible, the part having the ¾-inch hole is to be on the side of the lock nearest the street, ready to receive the ¾-inch end of the spindle, on which is placed the outside knob. An objection to the ordinary style of swivel-spindle locks and latches is that they require the services of very competent joiners in order to adjust them to the door. In some cases a locksmith is required, and in many instances where the work has been well done they have failed to give satisfaction from the fact of their liability to get out of order by use. The shoulder formed by the ¾-inch and ½-inch spindle employed in the lock here illustrated forces an adjustment of the joint in the spindle to the center of the lock. The same shoulder also prevents the pushing of the spindle through the hub from the outside after removing the outside knob. This, of course, prevents the opening of the door from the outside, which it is asserted can be easily done with other forms of swivel-spindle locks now in the market. To reverse a lock of this kind only requires that the latch and hub shall be turned over, always keeping the ¾-inch part on the outside. The ½-inch part of the hub being on the inside and adapted to the ½-inch part of the spindle enables the joiner to trim the inside of the door with any style of knob desired. The

Duplex Rabbet Plane and Fillets, or.

The Stanley Rule and Level Company, with office at 29 Chambers street, New York,



Duplex Rabbet Plane, Made by the Stanley Rule and Level Co.

and factory at New Britain, Conn., have added to the large assortment of special planes which they manufacture the device shown in the engraving. It is known to the Hardware trade as Plane No. 78, and the

company further direct attention to the fact that their swivel-spindle locks and latches are the only ones in the market which are

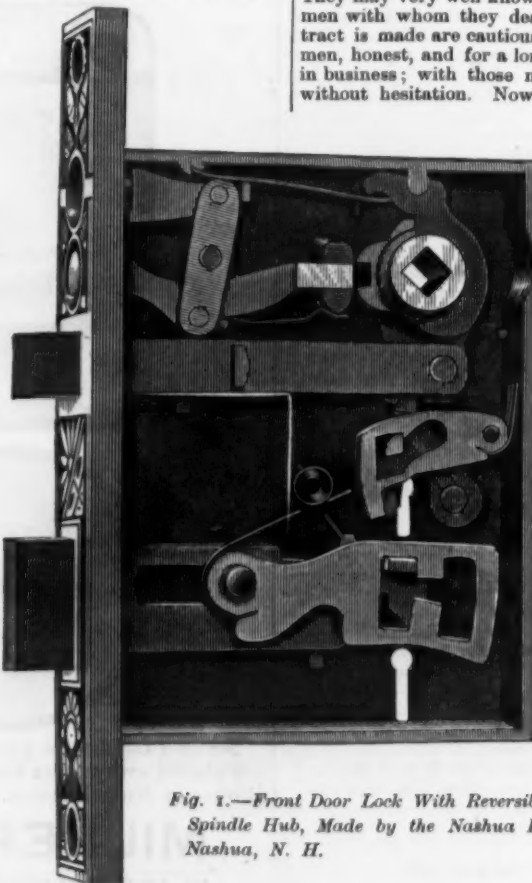


Fig. 1.—Front Door Lock With Reversible Swivel-Spindle Hub, Made by the Nashua Lock Co., Nashua, N. H.

reversible. Another feature to which they direct special attention is an anti friction device applied to the latches of these locks, a detail of which is shown in Fig. 4. This device is also of a character to permit the ready reversing of a lock. It is simple in character and very effective in use. It differs from other anti-friction devices from the fact that it is located inside the case of the lock, and hence does not deface the front of the lock or latch. The company also claim for their locks having rabbeted fronts special advantages over others, in that they can be used for any width of rabbet and any thickness of door, and at the same time are reversible. This, it is claimed, makes it possible to place these locks upon doors satisfactorily with far less skill than would otherwise be demanded, and the same time makes it possible for a hardware dealer to maintain his assortment with less stock than would otherwise be required.

The Lalance & Grosjean Manufacturing Company, of New York City, have obtained a patent for attaching a handle to enameled and other sheet-metal vessels without solder,

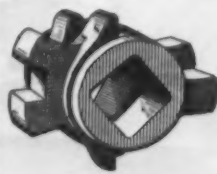


Fig. 3.—Detail of Divided Hub.

the principles of contracts to say that in dealing with one man, or with two men, those two can, afterward, acting without the consent of the other party, introduce another man into the contract who has all the rights and all the control which those two had before, because that man may be a scoundrel, may be known to be a scoundrel by the insurers, and if that rule prevails the other parties have a right to introduce the veriest scum of the earth, and men who have more than once been engaged in the destruction of property to get the insurance money."

TRADE-MARK—INFRINGEMENT—RESEMBLANCE. A manufacturer of tobacco had for his trade-mark for chewing tobacco a star affixed to a plug of tobacco, and another manufacturer subsequently used also a star to a plug of tobacco of about the same shape, but having his own name instead on the label. The labels in the trade-mark differed, but not materially. In this case—Liggett & Myer Tobacco Company vs. Hynes—in the United States District Court for the Northern District of Arkansas, an injunction was granted, Judge Parker, in the opinion, saying: "To constitute an infringement of a trade-mark exact similarity is not required; there may be an infringement without it. The difference in the trade-marks of the plaintiff and defendant in this case would perhaps be at once detected by the intelligent user of tobacco looking for his favorite brand, just as man of luxurious tastes would discern his favorite brand of champagne. But the plain-

tiff is entitled to protection if the trade-mark of the defendant would deceive the ordinary purchaser, purchasing as such persons ordinarily do. In this connection we must not lose sight of the character of the article, the use to which it is put, the kind of people who ask for it, and the manner in which they usually call for it. There is no trade-mark in the shape of plugs of tobacco, and, therefore, the defendant could make his plugs in any shape he pleased; but when he produces them so as to give the general appearance of the plugs of the plaintiff's make, and puts on them a device of such a character and of such shape and appearance as that the buyers of the tobacco, when they see the shape and appearance of the plug and the device on it, will be deceived into believing that they are buying the plaintiff's plug, he is violating the latter's rights."

PURCHASE OF PARTNERSHIP INTEREST—FALSE REPRESENTATIONS.

M. Brothers and S. were partners, and L. bought the interest of the former—one-half—in the concern, the value of which and the indebtedness were falsely stated to L. by S. and the bookkeeper, to whom M. Brothers referred L. as to the financial condition of the firm. The written contract showed a sale of the business to S. and L., which was continued by them for some time, when S. retired and L. went on alone. The loss resulting from the false representations to L. was about \$1500, for which he sued M. Brothers and recovered a judgment. The case—Lindmeier vs. Monaghan—was carried to the Supreme Court of Iowa, where the judgment was affirmed. Judge Beck, in the opinion, said: "1. Studman's misrepresentations in order to induce plaintiff to join him in the purchase, if made with defendants' authority, would render them liable. The mere fact that Studman united in the purchase cannot change the case if plaintiff was defrauded and injured thereby and the defendants received the benefits of the fraud. Equity will not permit frauds to be effectuated by any such expedients. 2. And if it should appear that Studman had no authority from defendants to make the fraudulent representations, the case is the same. It cannot be doubted that, with the knowledge and consent of the defendants, Studman took part in the negotiations leading to the purchase, in the course of which the false representations were made. The object of these negotiations was the benefit of defendants by securing a purchase. Studman will be regarded as defendants' agent, and they will be responsible for his fraud."

CARRIER—REFUSAL TO CARRY FREIGHT.

A railway company was sued for damages for refusing to carry coal under a contract. In this case—Northwestern Fuel Company vs. Burlington and Central Railroad Company—the United States Circuit Court for the District of Minnesota, through Judge Miller, in the opinion, said: "This sum claimed by the plaintiff—the amount of money sought to be recovered—is enormous, and, if the kind of proof which they offered of the violation of the contract was competent, it could have recovered of the company millions of dollars. It expected to recover a million dollars or more by virtue of this contract, and it is amazing to me that it was thought the company could be held liable when there was never a clear tender of the coal, saying 'Here is the coal of the fuel company, which we want you to carry over your road.' Now, there was no tender and no substitute for it. There can, therefore, be no recovery."

Failure of the Corroders' Combination.

As we have chronicled the progress made toward the formation of a combination among the white-lead manufacturers, we conclude the history of the movement with an announcement of its failure. The Independent Journal, of this city, says that the changes which one of the principal corroders of the West desired in the plan proposed by the committee of corroders, and which he made conditional upon signing the agreement, were such as other corroders did not care to make, and, as several of those who had not already subscribed to the plan had stated they would not sign the "plan", unless every corrodor in the United States using the old Dutch process would come into the arrangement, the proposed combination has fallen through, and those corroders who had already signed the agreement and who had already sent in their checks for \$500, have had them returned with the notification that all negotiations looking to the formation of a combination the plan proposed had, for the present, at least, been abandoned. "The prices of white lead, both dry and in oil," says the Journal, "have been so low for some time, compared with the price of pig lead, that we do not look for any material changes, although the prospects are that the quotations current of late will be shaded in the efforts of corroders seeking to introduce their brands or to displace others. So far as we have been able to obtain an expression of the opinions of corroders, they seem averse to making another attempt to form a combination."

A Very Large Tug.—The hull of what is said to be the largest and most powerful steam tug in America is about to be completed at Nettle & Levy's shipyard, Philadelphia. Capt. James B. Eads is the owner of the vessel. He will use it in his operations in the Gulf of Mexico, in the harbor of the city of New Orleans, and probably at Galveston, Texas, as a general ocean tug. Steel and iron are the only materials which have been used. The hull, which is 125 feet long on deck, 32 feet beam and 13½ feet deep in the hold, is made of the strongest possible iron frame, with steel used in all the other parts. It is divided into several watertight compartments. There are two engines of the compound type, with a 32-inch stroke, giving a 650-horse-power, and enabling the tug to carry along a vessel of 3000 or 4000 tons. The steel boilers are 8½ feet wide, 10½ feet high and 13 feet long. Although the vessel was not built for speed, it is expected that a rate of at least 14 miles an hour will be obtained. Captain Eads has not yet announced the name which he will give to his boat. The cost will be between \$50,000 and \$60,000.

The Sheffield Cutlers' Feast.

The time-honored banquet known as the Cutlers' Feast usually takes place in Sheffield, England, on the first Thursday in September. This year, in consequence of the absence of the master cutler elect in the United States, the banquet was postponed until the 15th of October. The Sheffield Telegraph thus describes the present master cutler: "Mr. J. E. Bingham, the present master cutler, fills the office for the second time, his last term as master having been in 1881-82. As is well known, he is the head of the well-known and extensive firm of Messrs. Walker & Hall, silversmiths and electro-platers, Howard street. He is also president of the Fair Trade League in Sheffield; vice-president of the National Fair Trade League; lieutenant-colonel of the First West York Engineer Volunteers; chairman of the West End Conservative Association, Sheffield; member of the Patents for Inventions Committee, London, 1885, and will shortly become worshipful master of the Royal Brunswick Lodge of Free Masons."

In referring to the banquet the Telegraph says that the Cutlers' Feast this year assumed larger dimensions than usual, as many as 400 guests signifying their intention of accepting the master cutler's hospitality. Among the after-dinner speeches delivered on this occasion, which our contemporary publishes in full, one of the most significant was that of the Right Honorable the Earl of Dunraven, who incorporated in his remarks the following references to the present depression in British trade, its cause, and the probable remedy:

"My right honorable friend Mr. Smith spoke of the state of paralysis of the trade of this country, and in doing so did not use a much too strong expression—not at all too strong an expression. Trade is in a depressed condition, and it is universally admitted to be so. All kinds of reasons are given for the condition in which trade is in at the present time. We are told it is owing to the improvident character of the workingmen, the habits of drunkenness, overproduction and all kinds of reasons. I believe none of these reasons will at all account for the state of things under which we suffer. I believe it is to be attributed to two causes, which are remedial and which ought to be remedied. I think it is chiefly due to the kind of blockade against our goods which has been instituted all over Europe, and also to the introduction duty free among us of articles unnaturally cheapened by bounties and the defects of the protective system. Practically speaking, the foreign markets are closed to us because the citizens buy nothing from us except those articles they cannot possibly do without and cannot make for themselves as yet. They place enormous duties, prohibitive duties, on the great bulk of our goods, and admit only those which, as I have said, they are unable to make under any circumstances. How much that state of things can be remedied it would be impossible for me to say in a few words. My impression is we might do a great deal toward relieving ourselves from the distress caused by the high tariffs in foreign countries. I am quite certain we shall never get any relief by lecturing them on the evils they are doing to themselves. They will only reply that they know their business better than we do; they will only tell us to attend to our own affairs, and leave them to attend to theirs. What is perhaps in some respects more important, is, I believe, the great detriment which accrues to us from the unnatural cheapening of foreign goods which come to us duty free. That is a matter which lies entirely in our own hands; that is a matter which we can remedy whenever we think well to do so. It can be remedied in a simple manner by laying such duties on imported goods as will be equivalent to the bounties which they receive, and enable our manufacturers and our operatives to compete on equal terms with foreign capitalists and foreign manufacturers."

The Westinghouse Engine Sales Agencies.—The Westinghouse Machine Company, of Pittsburgh, announce by circular, dated October 20, that the rapid growth of their business compels a new departure. They find it necessary to provide for a manufacturing capacity of 100 engines, aggregating 3500 horse-power per month. Hence, in order to concentrate their attention upon the development of the mechanical details of their business, they have resolved to place their commercial interests in the hands of representative firms in various quarters. Westinghouse, Church, Kerr & Co., 17 Cortlandt street, New York, assume charge of the trade formerly controlled by the New York branch office of the company; Fairbanks, Morse & Co., of Chicago, will, in connection with Fairbanks & Co., of St. Louis, control the trade of the Western States and Territories; Parke & Lacy, of San Francisco, Portland and Salt Lake City, will have charge of the Pacific Slope, and Inray, Hirsch & Kaepfel, of Sydney and Melbourne, will act for Australia and Oceania. Westinghouse, Church, Kerr & Co., of New York, announce also that they will carry on the business of contracting and consulting mechanical engineers, controlling the manufacture or sale of approved specialties. As the Westinghouse automatic engine is not at present built above 200 horse-power, they will contract for heavy plants of such other standard automatic engines as may be best adapted to each case. They will also furnish steam apparatuses generally.

German Competition in British Markets.—According to an English contemporary, German steel castings have been

largely used by English marine engine builders. A steel-making firm at Dortmund, in particular, have been pushing the sale of their castings in England with great pertinacity and success. The castings are all made of crucible steel. They are very sound and well finished, and are delivered at the Northern ports, by way of Rotterdam or Antwerp, at about the same price as English steel castings made by the Bessemer or Siemens processes are obtainable. But it is said that the German castings, being made by the crucible process, are freer from blow-holes, and generally sounder and more satisfactory. There is no doubt that marine engineers are now using steel castings more and more largely in place of iron ones. Although the cost per ton is about threefold, a portion of the weight can be saved, and even then they are infinitely stronger and more reliable. Indeed, says our informant, it would seem that the time is rapidly approaching when all the castings in a marine engine will be of steel, except valve casings and such details of an intricate form and without liability to heavy strain, and these will be made separate and bolted on. Besides castings, German steel-making firms are also offering to deliver slabs or blooms made by the basic process for rolling into plates or angles, at about English prices.

How the New Ocean Cable Reaches New York.—The New York end of the Bennett-Mackay ocean cable was placed on the Brooklyn Bridge on the 30th ult. When in proper position it will be suspended on hooks underneath the promenade. This will prevent its being exposed to the sun. The portion of the cable resting on the bridge will be 3400 feet in length, and will weigh 45,000 pounds. "The Bennett-Mackay Cable Company," says Superintendent Martin, "will pay the bridge trustees \$250 a year for the privilege of running their cable over the bridge. The Bennett-Mackay Company originally intended to place their cables under the river, but the engineers advised them to use the bridge instead, because the cables would be so much better protected on it. The bridge receives about \$700 per annum for carrying the wires that have been run over it."

CONTENTS.

	PAGE.
The Hoffman Regenerator Coke Oven. Illustrated.....	1
The New Dispatch Boat Dolphin.....	1
Submarine Warfare.....	5
The New Secretary of the Treasury.....	7
New Boring and Inside Threading Tool. Illustrated.....	9
A Smokeless Locomotive.....	9
Graphic Processes.....	9
Trade Publications:	
Valves and Cocks.....	11
Centrifugal Pumping Machinery.....	11
Specialties in Wood-Working Machinery.....	11
Pulleys, Hangers, Couplings, &c.....	11
Wrought-Iron Boilers.....	11
Steam Pumps.....	11
Steam Engines and Boilers.....	11
Die-Stocks.....	11
Iron Mines in Colorado.....	11
An Odd Weather Vane.....	11
An Ornate Iron Building.....	11
Internal Corrosion and Scale in Steam Boilers.....	13
The New York Bureau of Labor Statistics.....	13
Novel Method of Strengthening a Bridge Pier.....	13
New Inventions.....	15
Brass-Founders' Sprue Cutter. Illustrated.....	15
Le's Steam Pump. Illustrated.....	17
Driving by Friction.....	17
Standard Sizes for Hexagon Bolt Heads and Nuts.....	17
New Publications:	
The Steam Engine Indicator.....	17
The Young Engineer's Own Book.....	17
Steam Boiler Incrustations.....	17
Transactions of the American Society of Mechanical Engineers.....	17
Pilley's "Diamond F" Slotted Ball-Valve Taper Iron. Illustrated.....	17
Penetrating Power of Lights.....	17
Industrial Items.....	19
The Water Supply of Venice.....	21
Protecting River Banks from Caving.....	21
Southern Coal Exports.....	21
Editorial:	
Presidential Elections.....	22
Misrepresenting the Tin-Plate Reform Movement.....	22
Our Domestic Export to Non-European Countries.....	22
The Steel-Rail Trade.....	22
The Present Condition of the Swedish-Iron Industry and Its Connection with American Trade.....	22
The Iron Age Directory.....	25
Trade Report:	
British Iron and Metal Markets.....	27
Financial.....	27
Metal Market.....	27
Coal.....	27
Philadelphia.....	28
Pittsburgh.....	28
Chicago.....	28
Chattanooga.....	28
Cincinnati.....	28
Louisville.....	28
St. Louis.....	28
Baltimore.....	28
Imports and Exports.....	28
Foreign Markets.....	28
General Hardware.....	28
New York Iron Market.....	30
Disastrous Coal Mine Explosion.....	29
No Strike at the Birmingham Mill.....	31
Electric Lighting.....	31
Scientific and Technical:	
A New Caoutchouc.....	31

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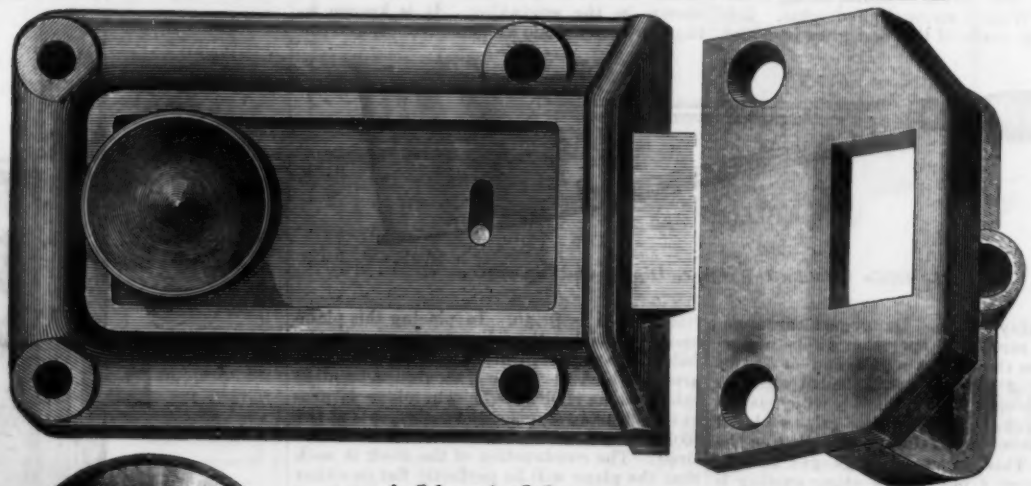
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Utilizing Phosphorized Slag.....	31
Electrical Phenomena of Flames.....	31
English Letter.....	38
American Labor the Best in the World.....	38
New York Wholesale Hardware Prices.....	34
New York Wholesale Metal Prices.....	36
Hardware Novelties:	
The Fenner Hand Scroll or Turning-Out Saw. Illustrated.....	37
The Globe Combined Weigher, Dipper and Measure. Illustrated.....	37
Fastening for Window Beads. Illustrated.....	37
Duplex Rabbit Plane and Filletster. Illustrated.....	37
Improved Door Locks. Illustrated.....	37
Latest Legal Decisions.....	37
Failure of the Corroders' Combination.....	37
A Very Large Tug.....	37
The Sheffield Cutlers' Feast.....	38
The Westinghouse Engine Sales Agencies.....	38
German Competition in British Markets.....	38
How the New Ocean Cable Reaches New York.....	38
Philadelphia and Pittsburgh Hardware and Metal Prices.....	55
Boston Hardware and Metal Prices.....	56

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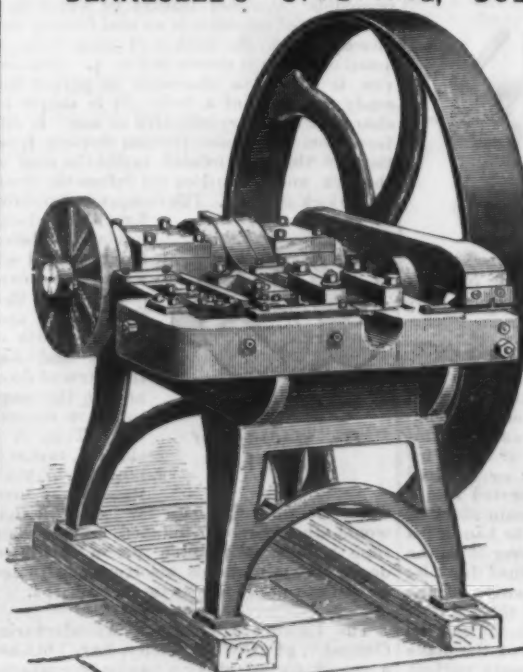
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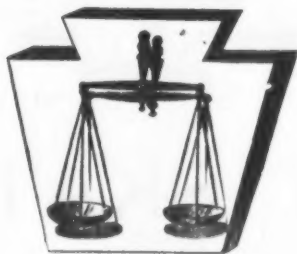
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HENRY DISSTON & SONS,



KEYSTONE SAW, TOOL, STEEL AND FILE WORKS, PHILADELPHIA, PA.

GREAT AMERICAN TOOTH.



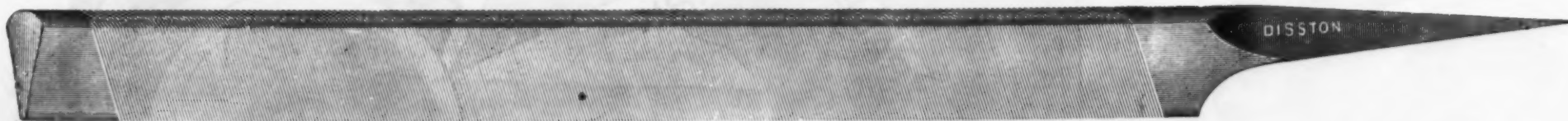
IN PRESENTING THIS SAW FOR YOUR CONSIDERATION, we state that it has been subjected to the most severe tests to which cross-cut saws are put, proving to the user and ourselves that it is the best cross-cut saw for general use ever offered to the public. This saw has given unbounded satisfaction wherever used. We are daily receiving numerous orders for them, the sales alone on the GREAT AMERICAN SAW for 1883 reaching \$25,000; in fact, some sections of the country will not use any other style. The manufacturers take pleasure in saying that there is no saw now in the market by which so much work can be done in ten hours with so little labor as with the GREAT AMERICAN CROSS-CUT SAW. This saw is made of a superior quality of steel, temper and finish. They are ground by new and improved machinery, making them a true taper from teeth to back, the back being fully four gauges thinner than the teeth, which enables them to run with less set and greater ease than any other saw in the market.

WITH SUPPLEMENTARY HANDLE.

PATENTED OCTOBER 4, 1870.



The above cut represents the GREAT AMERICAN ONE-MAN CROSS-CUT SAW with Supplementary Handle. This saw is made of the same steel and on the same principle as the celebrated No. 7 Hand-Saw.

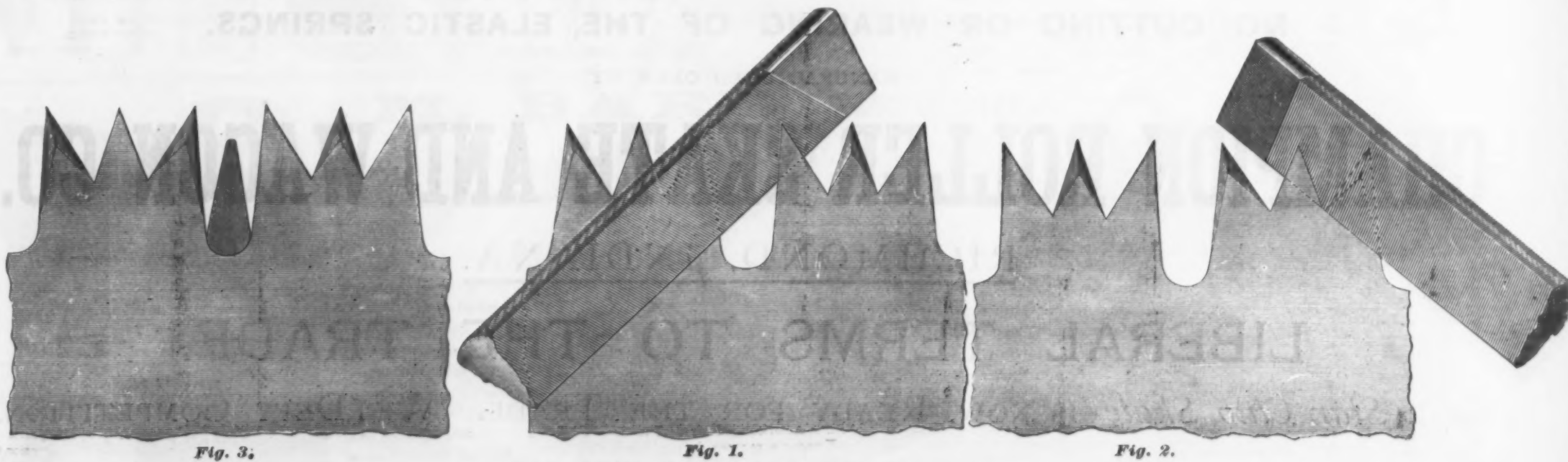


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Fig. 1 shows the manner of filing the long edge of the end tooth.

Fig. 2 shows the manner of filing the short or inside edge of the end tooth.

Fig. 3 shows the section of the file in the gullet of the saw.



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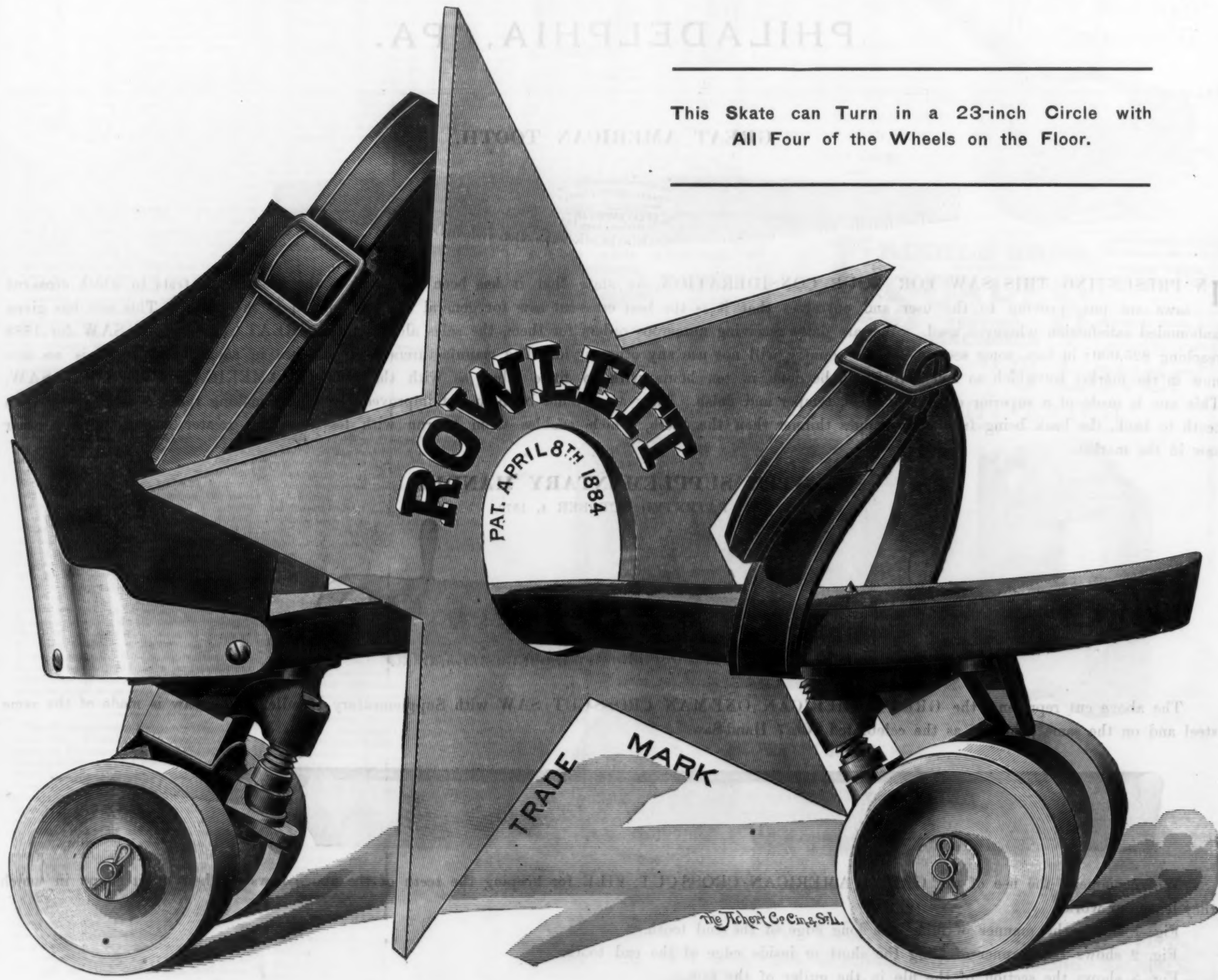
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IT IS THE LIGHTEST SKATE IN THE MARKET,

AND THEREFORE A SPECIAL FAVORITE WITH LADIES AND CHILDREN.

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This Skate can Turn in a 23-inch Circle with All Four of the Wheels on the Floor.



NO CUTTING OR WEARING OF THE ELASTIC SPRINGS.

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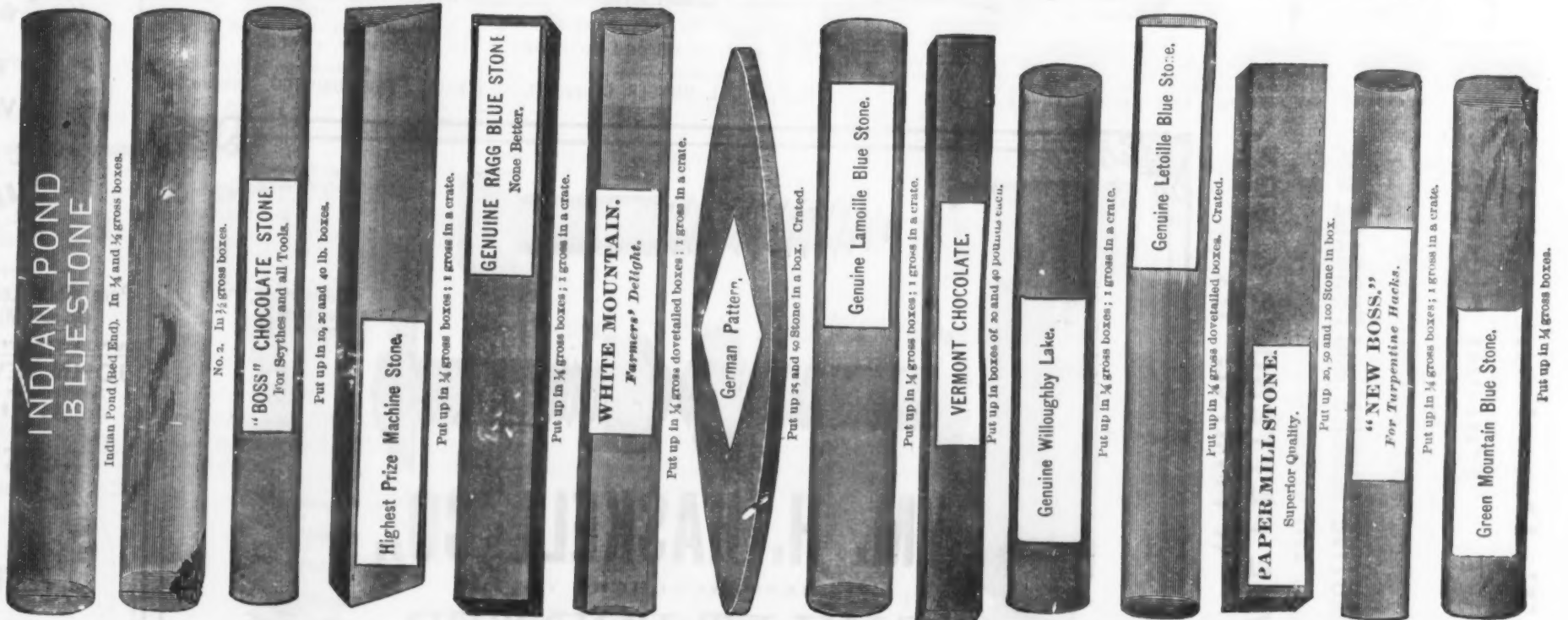
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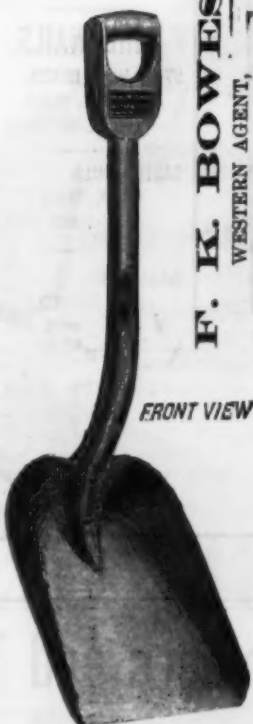
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THE MODEL EXPANSIVE BIT.
(Ives' Patent.)

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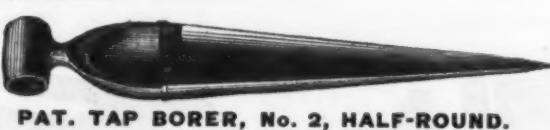
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EXPANSIVE HOLLOW AUGER, No. 1.
(Ives' Patent.)



PAT. TAP BORER, No. 2, HALF-ROUND.



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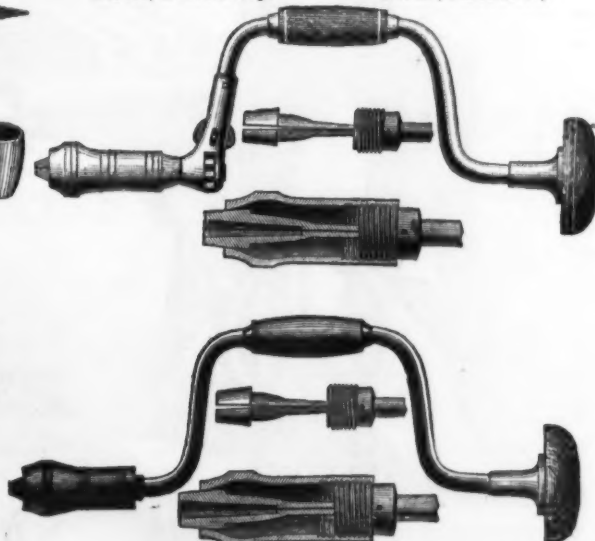


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STEEL BOTTOM CLUB SKATE

Sizes from 1 to 9.

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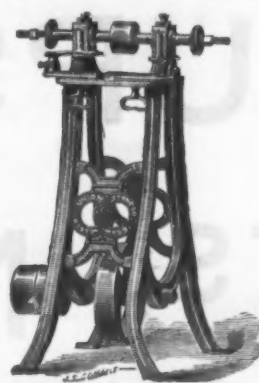
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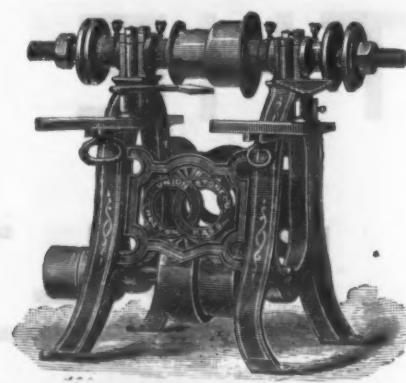
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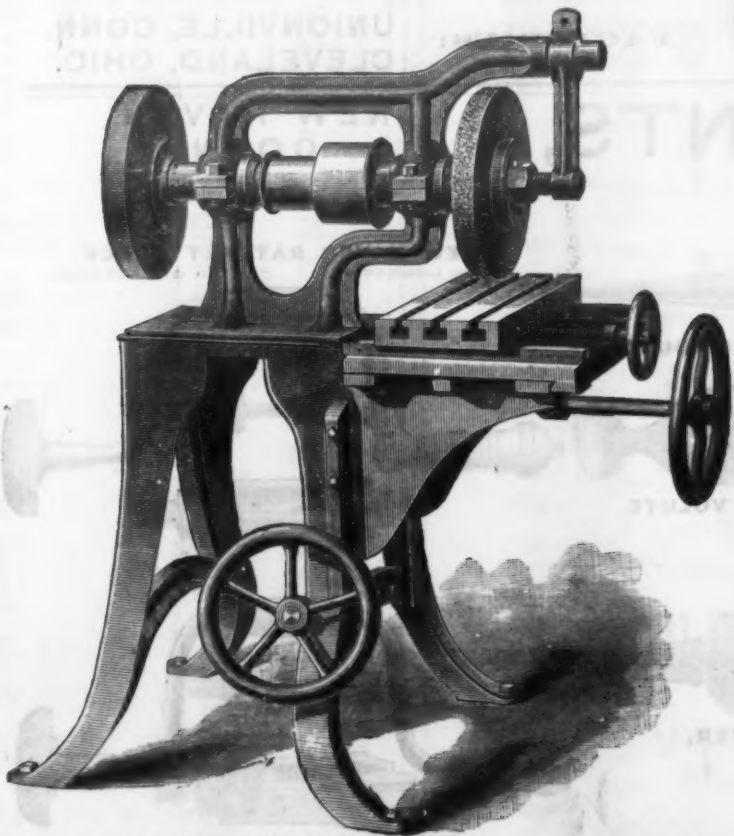


D Machine has 1 1-2 in. Arbor.

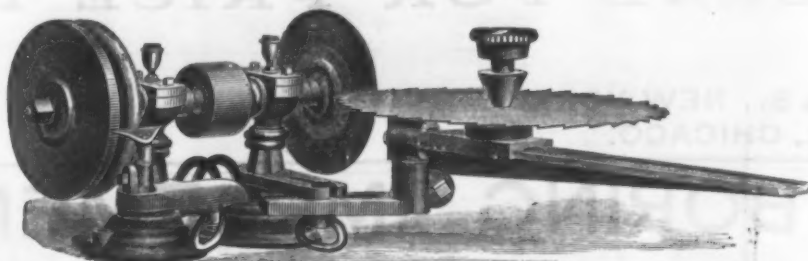


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UNION EMERY WHEEL DRESSERS



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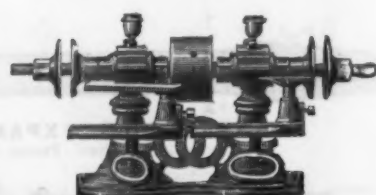


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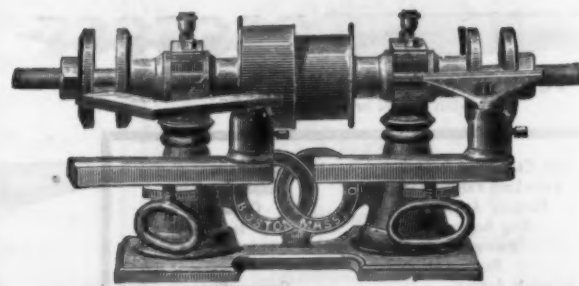
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ON
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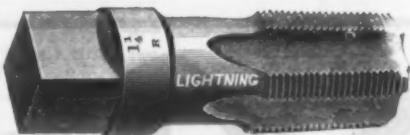
LIGHTNING



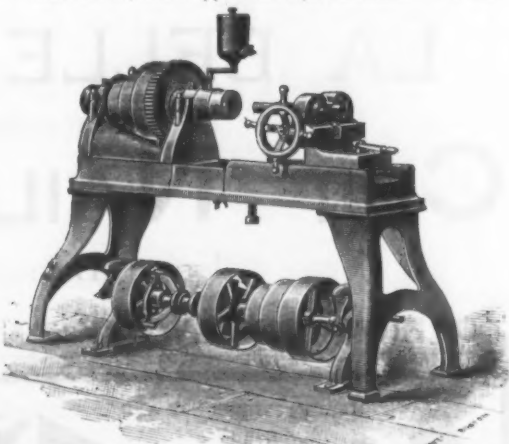
LIGHTNING



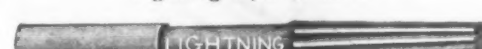
Green River Tire-Shrinker.



LIGHTNING



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LIGHTNING



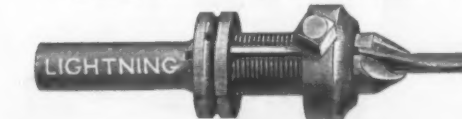
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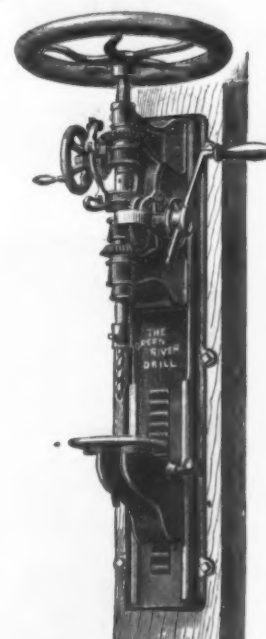


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REPORT OF WORLD'S FAIR, MELBOURNE 1881

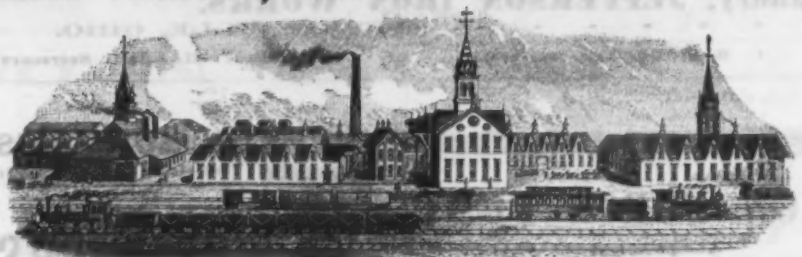
"Was the only cutlery sent to the fair with the request that they submit it to the most severe tests. Nails were whittled and wire cut with these knives, a test which the English and other makers declined to submit their goods to."

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Prize Medal Exhibit, Paris Exposition 1878
From Photographs. Show Case 12 feet wide 9 feet high.

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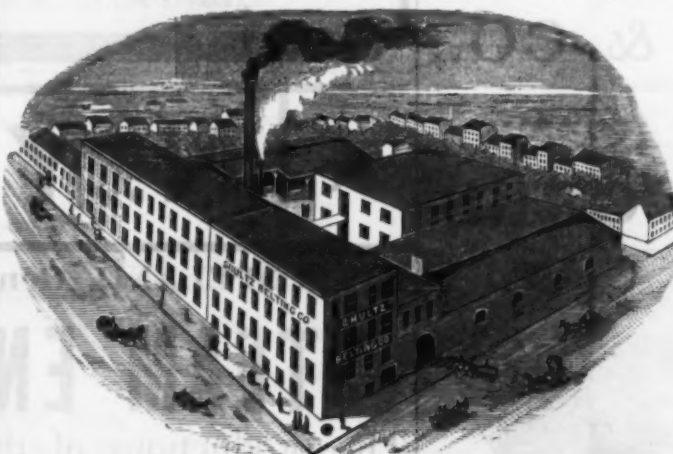
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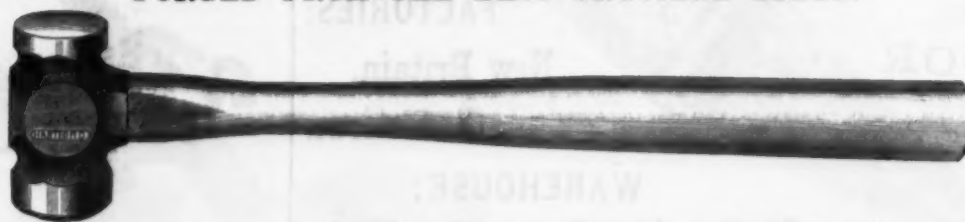
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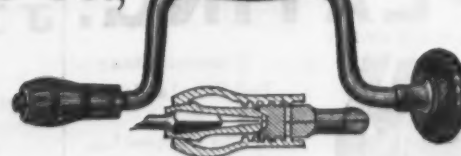
JOHN H. GRAHAM & CO., New York, Sole Agents

JOHN S. FRAY & CO., BRIDGEPORT, CONN., U. S. A.



Spofford Bit Brace.

The Spofford Bit Brace is made under Letters Patent of the U. S. A., granted to N. Spofford, March 23, 1884, assigned to John S. Fray & Co.
All Iron, Five Sizes.
No. 7.....7 inch sweep.
No. 8.....8 " "
No. 9.....9 " "
No. 10.....10 " "
No. 12.....12 " "
No. 14.....14 " "



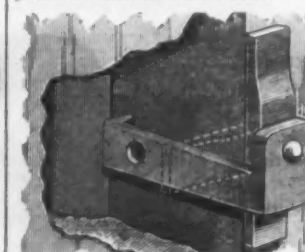
Spofford Sleeve Brace.

Cocobolo Head and Handle, Nickel Plated.
No. 107.....7 inch sweep.
No. 108.....8 " "
No. 110.....10 " "
No. 112.....12 " "
No. 114.....14 " "

Sleeve Brace, Nickel Plated.
No. 70.....7 inch sweep.
No. 80.....8 " "
No. 100.....10 " "
No. 120.....12 " "

LITTLE GIANT DOOR FASTENER.

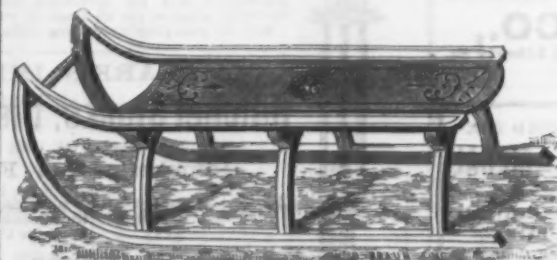
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Send for Descriptive Circular, or enclose 25 cents for sample, to Bay State Novelty Co., 17 Hermon St., Worcester, Mass.

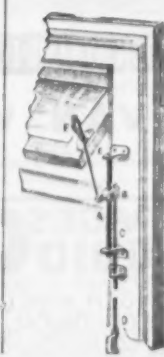
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THE REIHER IMPROVED Self-Locking Transom Lifter answers equally well for all Transoms.

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A. The locking bar.
B. The self-locking adjusting block.
C. The operating rod.
D. The lower bracket.
E. The lifting arm.
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"THE DUNLAP,"
CAN OPENER.

PAT. FEB. 29 1876



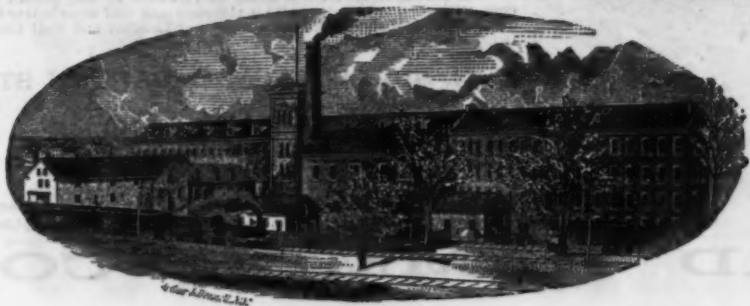
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WAREHOUSE:
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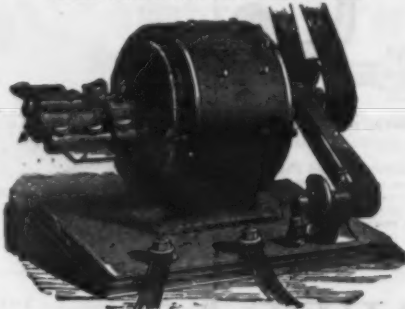
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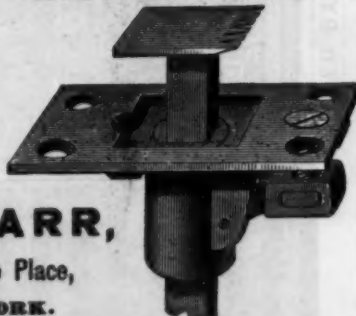
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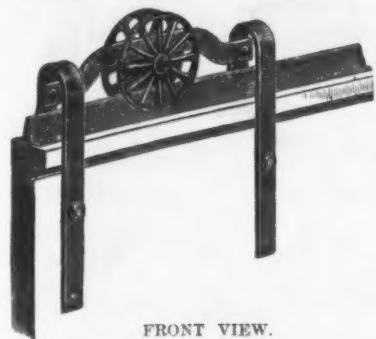
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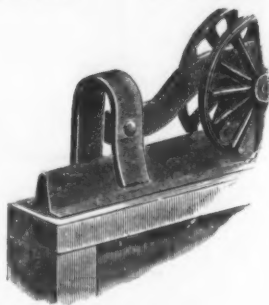
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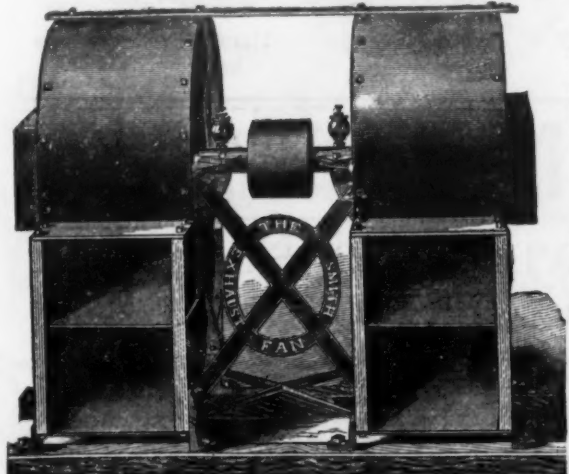
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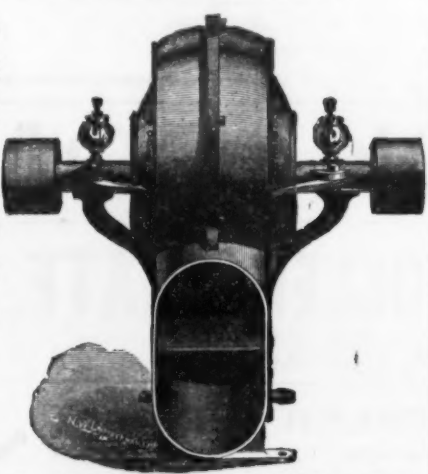
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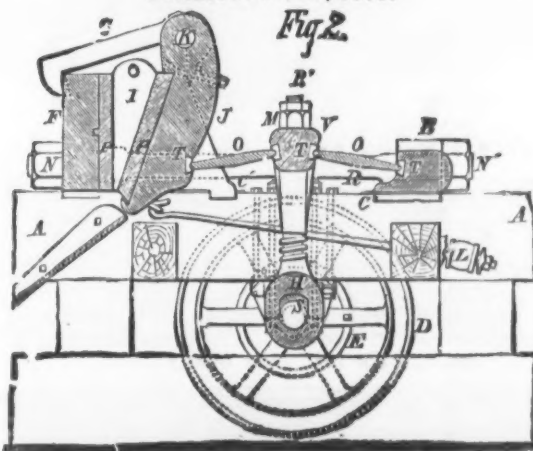
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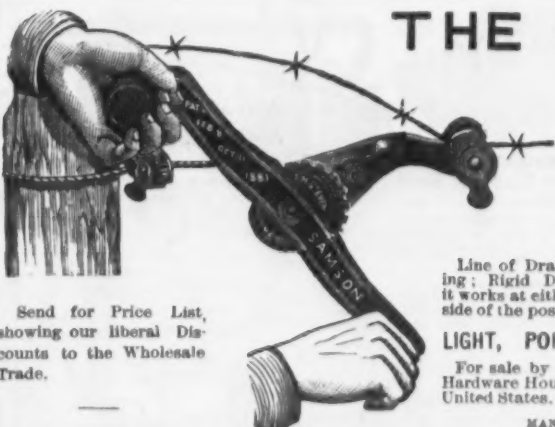
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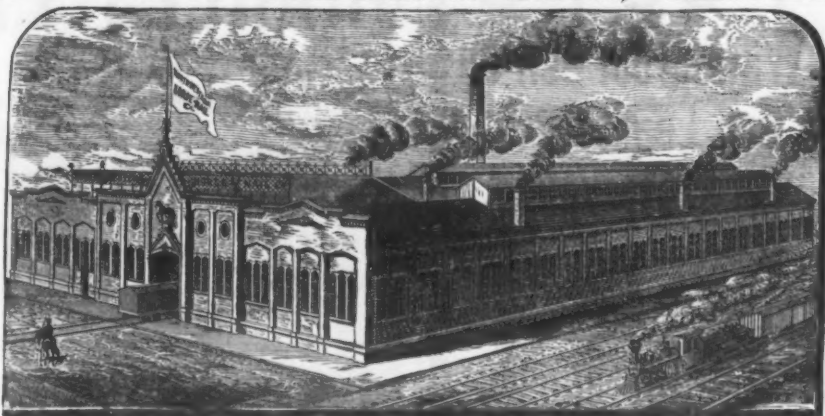
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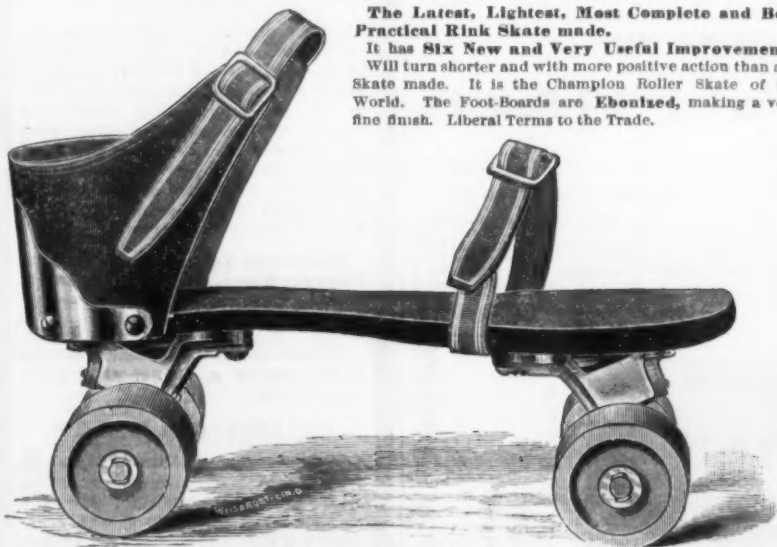
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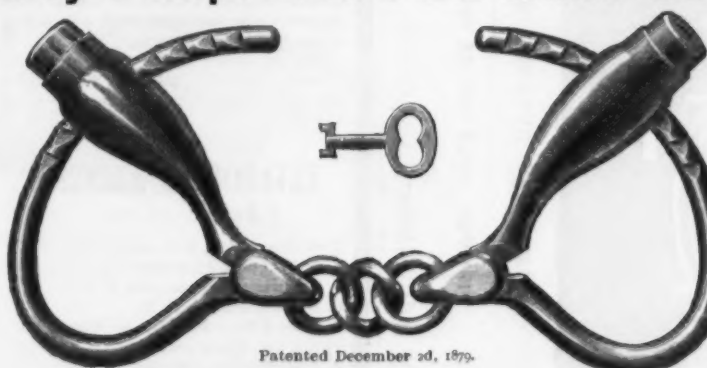
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BROOMS.

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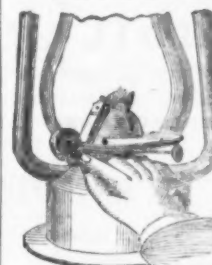


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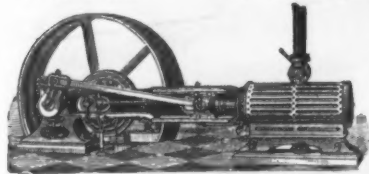
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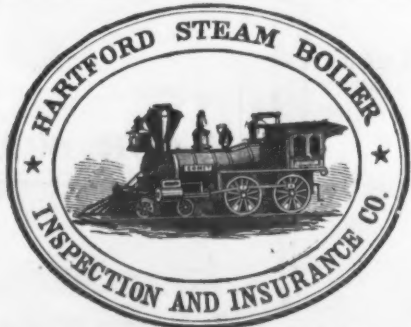


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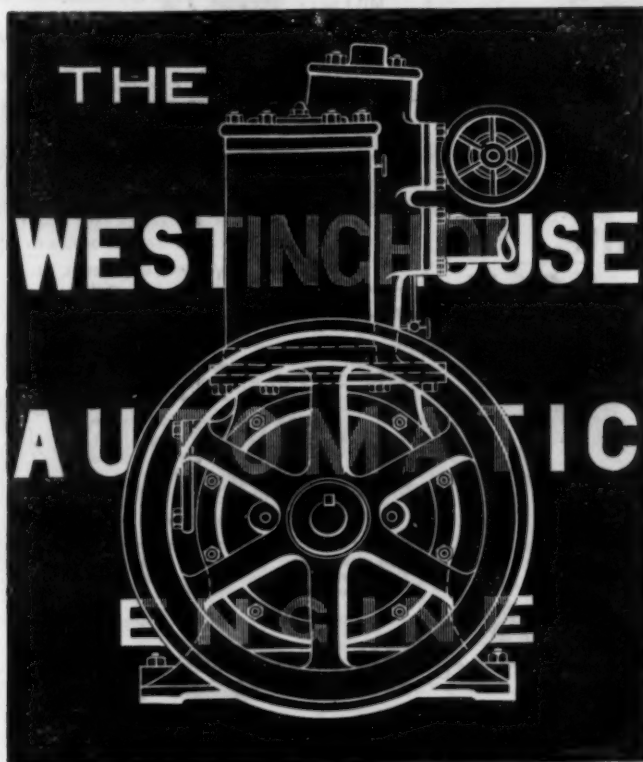
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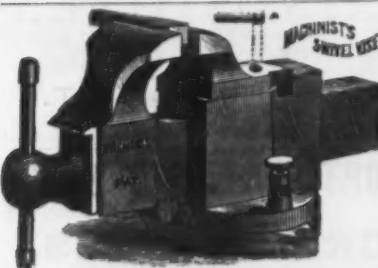
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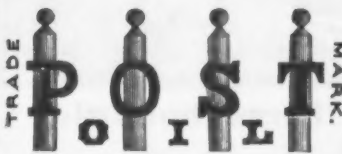
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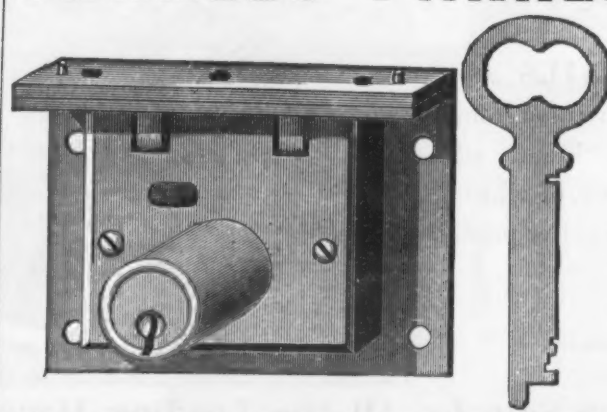
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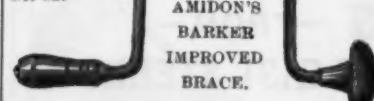
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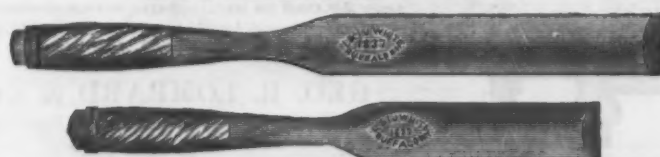
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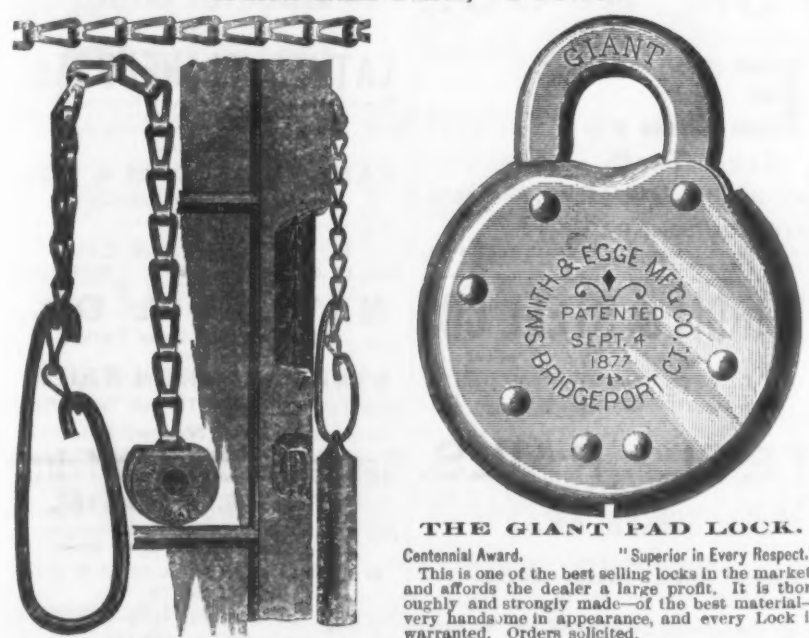
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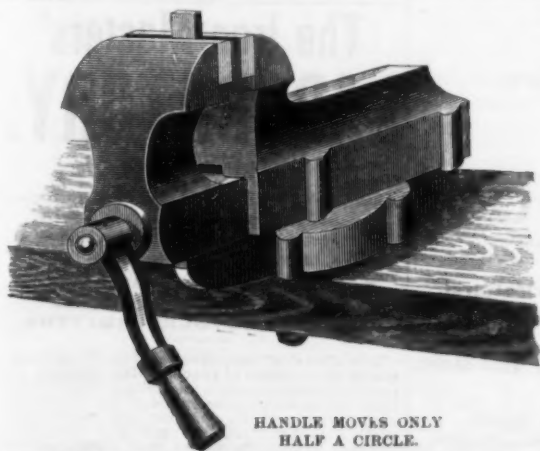


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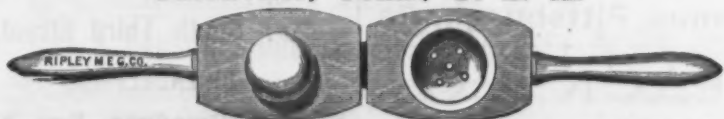
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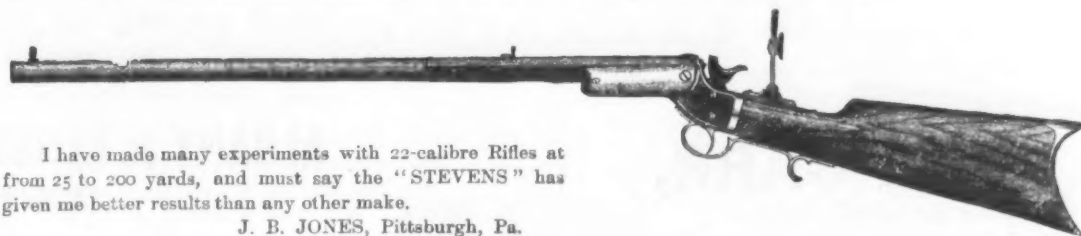
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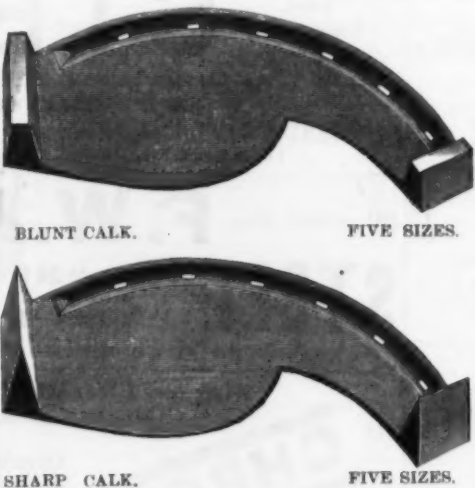
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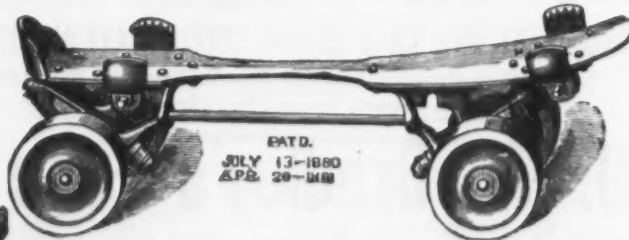
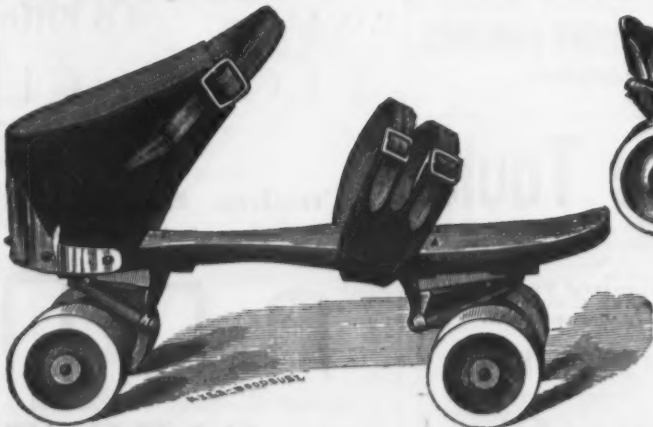
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194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 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"Lion" Brand of Band Saws Best and Cheapest Made.
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No. 1 Carries 7 feet earth.
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The York Pat. Steel Scraper

The Lightest and Strongest Scraper made. The body is made of one single piece of steel. The
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MANUFACTURERS OF
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Superior Corrugate
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CABLE AND CHAMPION SASH-CHAINS
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The most RELIABLE and CHEAPEST article in the market for sus-
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Samples Sent to Any Hardware House Free on Application.
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BEST AND CHEAPEST.
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Edge Pressed Furnace Blocks,
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Twenty years' practical Experience.

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Established 1836.
Successors to JOHN R. WATSON, Perth Amboy, New Jersey,
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FOR ROLLING MILLS, BLAST FURNACES, FOUN-
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Fire Clays, Fire Sand and Kaolin for Sale.

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LARGE REDUCTION
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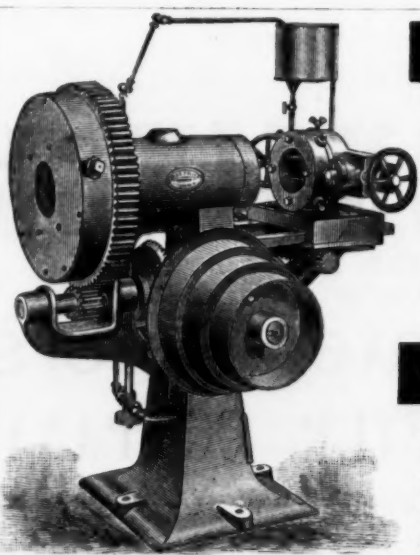
It will throw a continuous jet FROM
FORTY TO SIXTY FEET. A new pattern
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FIRE BRICK OF ALL SHAPES.
TRY OUR
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Its Effect on the Cupola is Wonderful.
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Have sufficient Pipe-Work
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THE LATEST THING OUT.

IDEAL MOUSE TRAP.

So perfectly simple in construction there is
nothing to get out of order, as is the case with all
other traps made on this principle. Guaranteed
to give perfect satisfaction. Send for sample
gross and you will not have any other trap that
catches mice alive. The inventor of the Ideal in-
vented all of the leading traps in the market to-
day, and he says this one is perfection. Great
care is taken in the manufacture of the Ideal, and
every trap is perfect. A single trap for inspection
will be sent by mail upon receipt of 2c. in
stamps.

The Cyclone Mouse Trap.

We invite the attention of dealers
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Patented Nov. 5, 1884, and now
having an immense sale. It is
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so sensitive that the mouse who
ventures to touch his nose to
the bait box is doomed. Our sales-
men on the road say it is the most
popular trap ever offered to the
trade. One of our men in a single
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ROOFING. Patent Cap Beam Roofing, in Four Styles. In Sheets
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Term 30 days. For 60 or 90 days, interest added at 8 per cent. per annum.

Avails.
 Peter Wright's, 10¢ @ 10¢
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 Lots of 10 to 25 dozen, special prices.

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 Hunt's Kentucky and Yankee, 7¢ doz. net.
 Robert Mann, 7¢ doz. net.
 Richmond Chief, 7¢ doz. net.
 Beveled Axes, add 50¢
 Double Bit Axes, net \$12.00

Augers and Auger Bits.—New List, January 7, 1880.

Bates' Nut Augers, 40¢ doz.
 Cook's Augers, 40¢ doz.
 Watrous Ship Augers, 40¢ doz.
 Benjamin Pierce Auger Bits, 40¢ doz.
 New Haven Copper Company, 40¢ doz.
 Snell's Augers and Bits, 40¢ doz.
 Snell's Ship Augers, 40¢ doz.
 Cook's Auger Bits, 40¢ doz.
 Jennings' Auger Bits, new list Jan. 1880, 25¢ doz.
 Bonney's Pat. Hol. Augers, list \$48 7¢ doz. dis. 40¢ doz.
 Stearns Pat. Hol. Augers, list \$48 7¢ doz. dis. 40¢ doz.

Bellevue.
 Light and Common, 40¢ doz.

Bells.
 Berlin Bros. Mfg. Co. Light Hand Bells, dis. 75¢ @ 75¢

Swiss Pattern Hand Bells, 60¢

Connell's Door Bells, 60¢

St. Western & Kentucky Cow, new list, 70¢

Boring Machines.
 Upright, without Augers, List, \$5.50, dis. 50¢ @ 50¢

Angular, without Augers, List, 6.75, dis. 50¢ @ 50¢

Bolts.—Eastern Carriage Bolts, new list, June 10, 1880, 75¢ doz.

Philadelphia Carriage Bolts, new list, dis. 75¢ doz.

Stanley, Wrought Shutter, dis. 50, 10¢ doz.

Braces.—Barber's, dis. 40¢ doz.

Backus, dis. 50¢ doz.

Spodoff, dis. 50¢ doz.

American Ball, dis. 55¢ doz.

Butts.—Cast Fast Joint, Narrow, dis. 40¢ doz.

Cast Fast Joint, Broad, dis. 40¢ doz.

Cast Loose Joint, Narrow, dis. 40¢ doz.

Cast Loose Joint, Broad, dis. 40¢ doz.

Cast Acorn, Loose Pin, dis. 40¢ doz.

Cast Acorn, Japanned, dis. 40¢ doz.

Cast Acorn, Loose Pin, dis. 40¢ doz.

Wrought Loose Pin, dis. 40¢ doz.

Wrought Table Hinges and Back Flaps, dis. 55¢ doz.

Wrought Narrow Fast, dis. 55¢ doz.

Wrought Loose Joint, dis. 60¢ doz.

Blind Butts.
 Clark, dis. 75¢ doz.

Shepard, dis. 75¢ doz.

Lull & Porter, dis. 75¢ doz.

Huffer's, dis. 50¢ doz.

Chairs.—Bed new list July 1, 1880, dis. 50¢ doz.

Plate, dis. 50¢ doz.

Chains.—German Halter and Coll, list June, 1884, dis. 50¢ doz.

Galvanized Pump, 7¢ doz.

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Socket Framer, dis. 70¢ doz.

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Enterprise, dis. 40¢ doz.

Cutlery.—Walden Pocket, new list net

Pennsylvania Knife Co., new list net

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Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' prices net.

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 Bart Mfg. Co., dis. 40¢ doz.

Adjustable Handle, dis. 40¢ doz.

Fry Pans.
 10 doz., \$3.50 4.50 5.00 5.50 6.00 6.50 7.00 7.50 8.00 10.00

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Flat Head Iron, 10¢ doz.	75¢
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Gem No. 2 small Japanned, 2.75	50¢
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Coil No. 10 7 gross net, 10.00	50¢
Other Standard Springs, 10.00	50¢
Warner Door Springs, 7 doz. 2.50	40¢
Standard Spring Hinge—	
Single No. 0, 7 doz. net, 1.25	40¢
Single No. 1, 7 doz. net, 1.50	40¢
Other Standard Spring Hinges, 1.25	40¢
Stoves, Polish, & Dics.	
Dixon, 10.00 gross, 10.00	40¢
Fire Fly, 10.00 gross, 10.00	40¢
Shoe Nails—4-8, and over, 7¢	40¢
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Genuine Oneida—Newhouse, 10.00	35¢
Im. Oneida—Newhouse, 10.00	35¢
Vices. —Solid Box, Trenton new list, 45¢ @ 50¢	
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Cos' Genuine, 10.00	75¢
Cos' Mechanics', 10.00	75¢
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Wire.	
Bright or Annealed, No. 0 to 18, 67¢	75¢
Bright or Annealed, No. 19 to 20, 70¢	75¢
Bright or Annealed, No. 21 to 22, 70¢	75¢
Copper, 0 to 18, 62¢	75¢
Tinned Broom Wire, 62¢	75¢
Painted Barb Wire, 74¢	75¢
Galvanized No. 7 to 18, Market List, 47¢ @ 50¢	75¢
Wireless.	
Peerless No. 2, 10.00	30¢
Peerless No. 2, 10.00	30¢
Universal No. 2, 10.00	30¢
Universal No. 2, 10.00	30¢
Novelty No. 2, for common tubs, 30.00	30¢
Novelty No. 2, 30.00	30¢
Excelsior for stationary tubs, 34.50	30¢
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Merchant Iron.

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1 1/2 to 4 by 1/2 to 1 inch, 2.5¢

1 1/2 to 4 by 1 1/2 to 1 1/2 inch, 2.5¢

1 1/2 to 4 by 1 1/2 to 1 1/2 inch, 2.5¢

1 1/2 to 4 by 1 1/2 to 1 1/2 inch, 2.5¢

1 1/2 to 4 by 1 1/2 to 1 1/2 inch, 2.5¢

1 1/2 to 4 by 1 1/2 to 1 1/2 inch, 2.5¢

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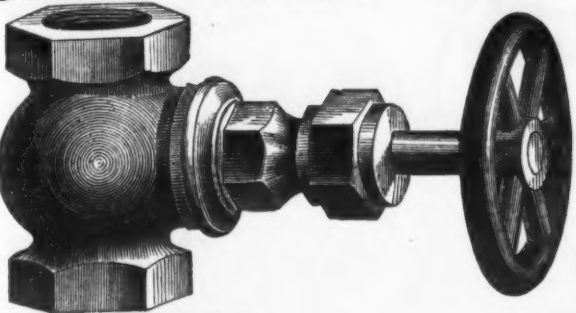
1 1/2 to 4 by 1 1/2 to 1 1/2 inch, 2.5¢

1 1/2 to 4 by 1 1/2 to 1 1/2 inch, 2.5¢

1 1/2 to 4 by 1 1/2 to 1 1/2 inch, 2.5¢


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McNab & Harlin Mfg. Co.,
MANUFACTURERS OF
BRASS COCKS AND VALVES,
For STEAM,
WATER,
and GAS.
Wrought Iron
Pipe
and Fittings,
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MATERIALS.**



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**GIMLET POINT
COACH SCREWS**



Bolts, Cold-Punched Nuts & Washers,
SUITABLE FOR MACHINERY OF ALL KINDS.

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Philadelphia "STAR" Bolt Works.
NORWAY IRON FANCY HEAD BOLTS,
Carriage & Tire Bolts. Star Axle Clips, &c.
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TENSILE STRAIN: 56,000 to 64,000 lbs.
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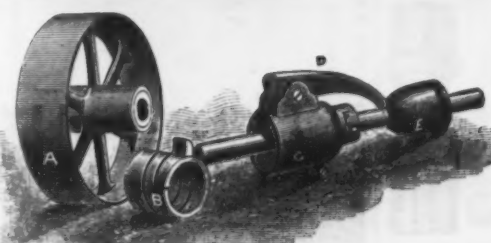
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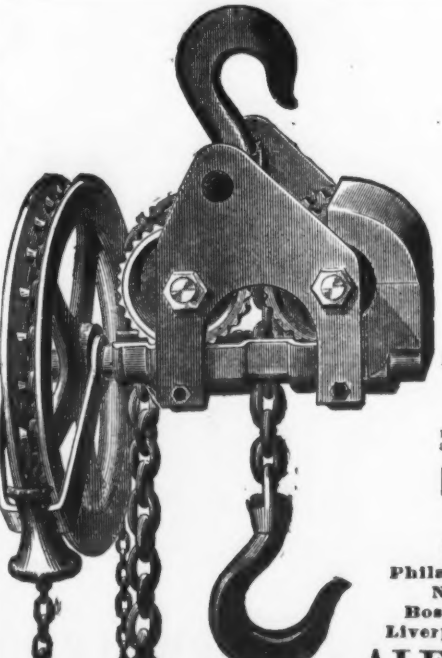
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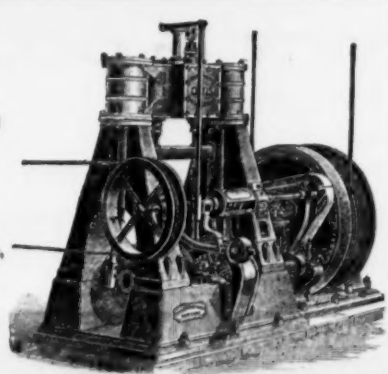
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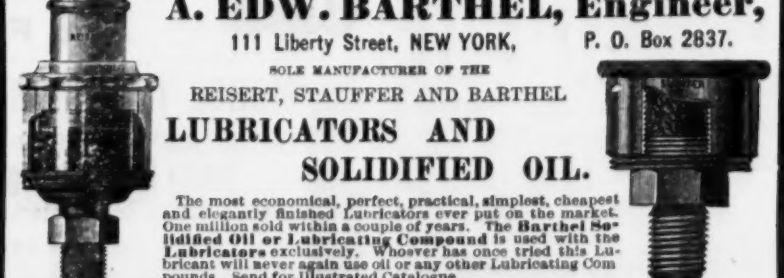
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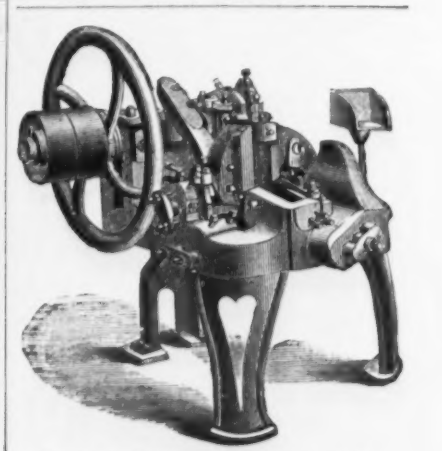


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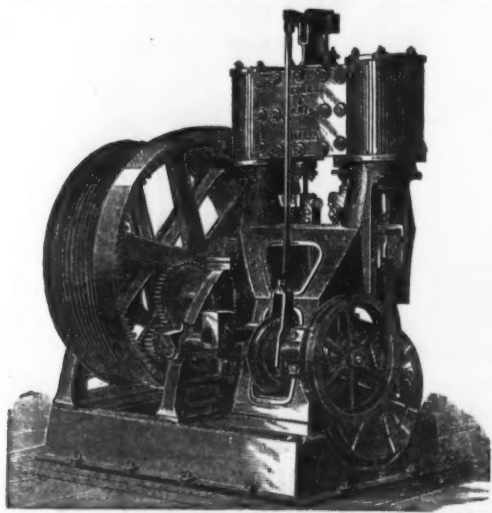
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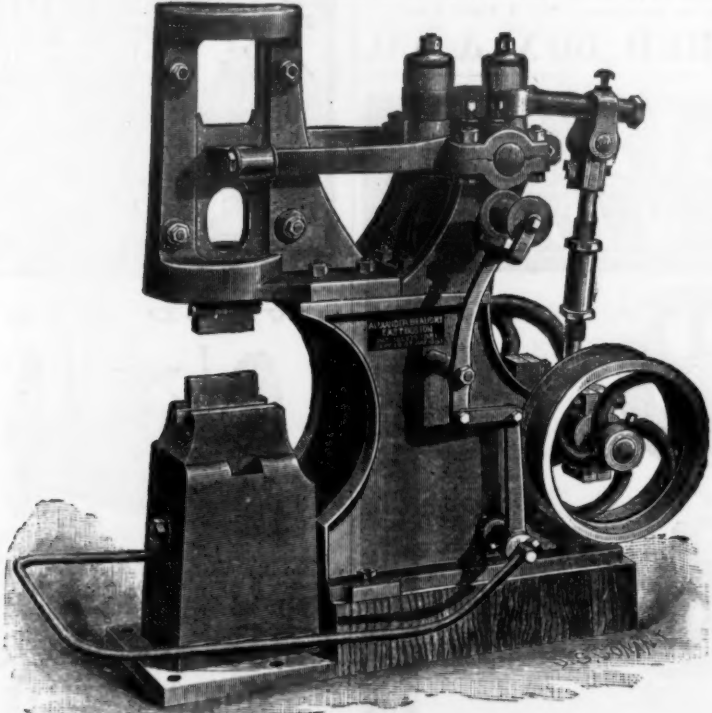
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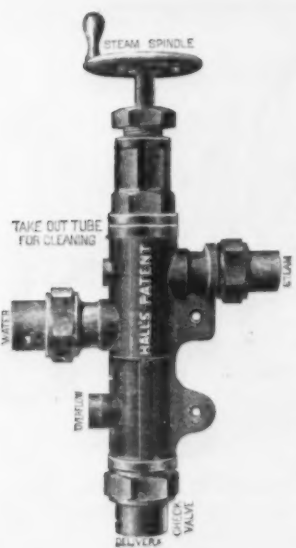
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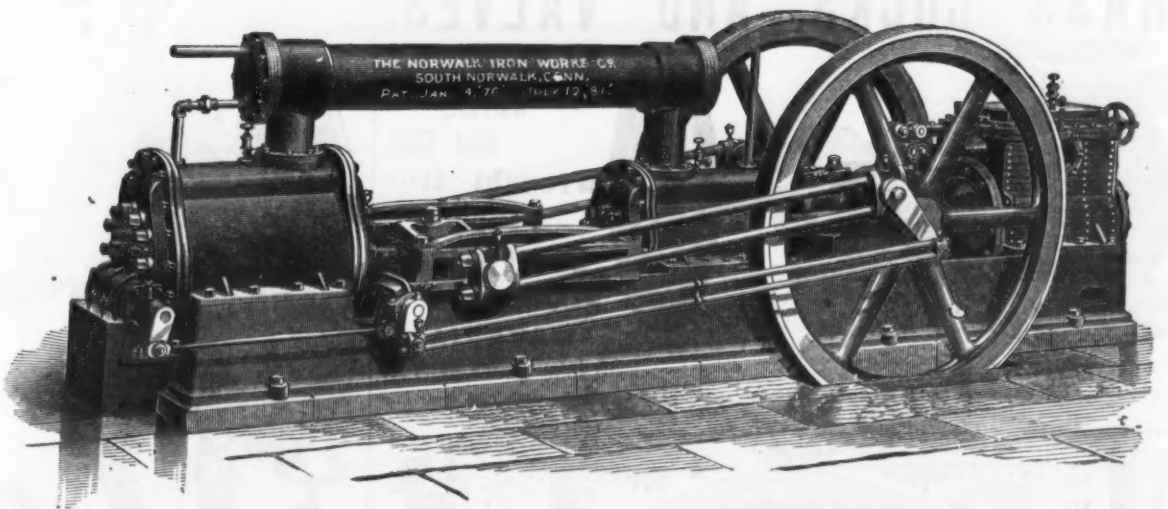
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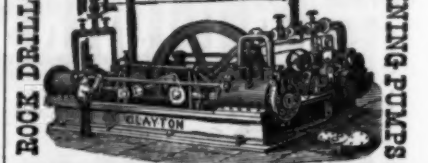


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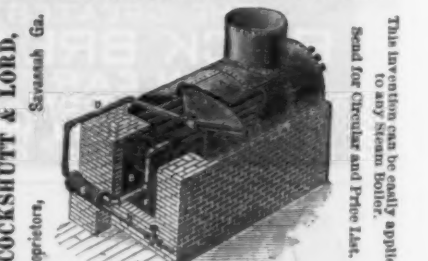


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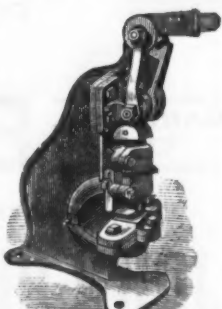
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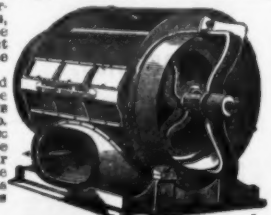


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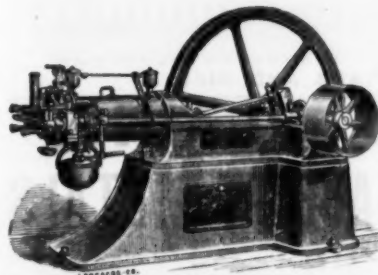
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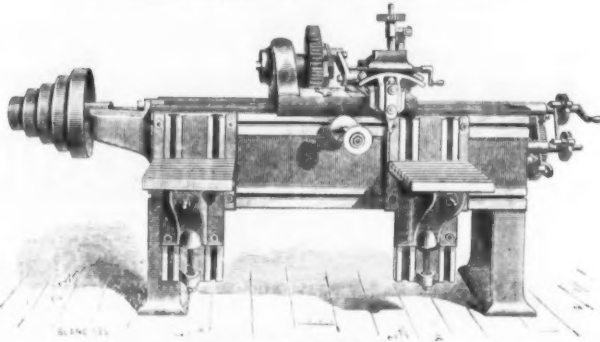
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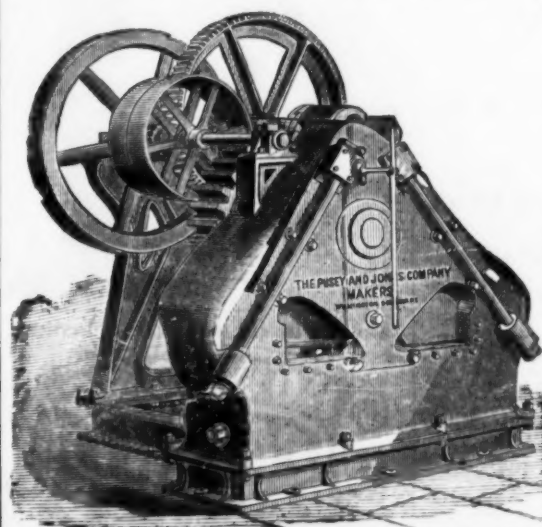
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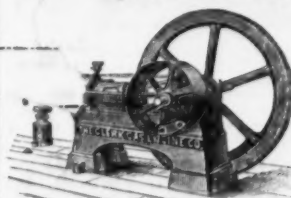
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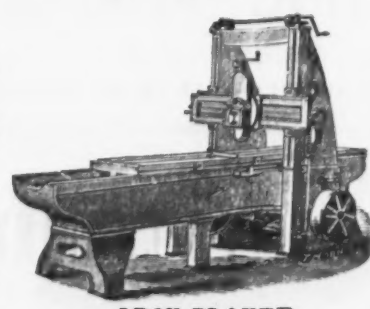


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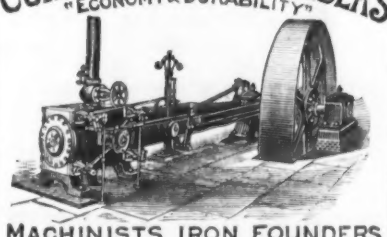
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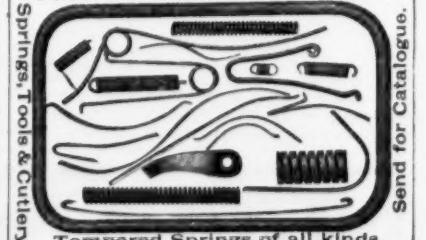
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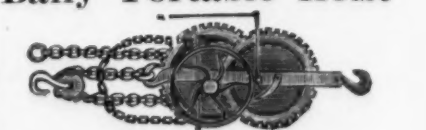
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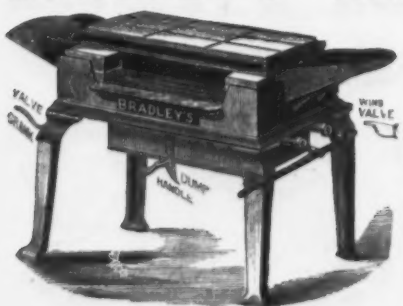
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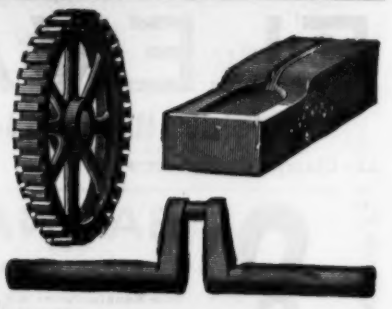
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